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American Machinist

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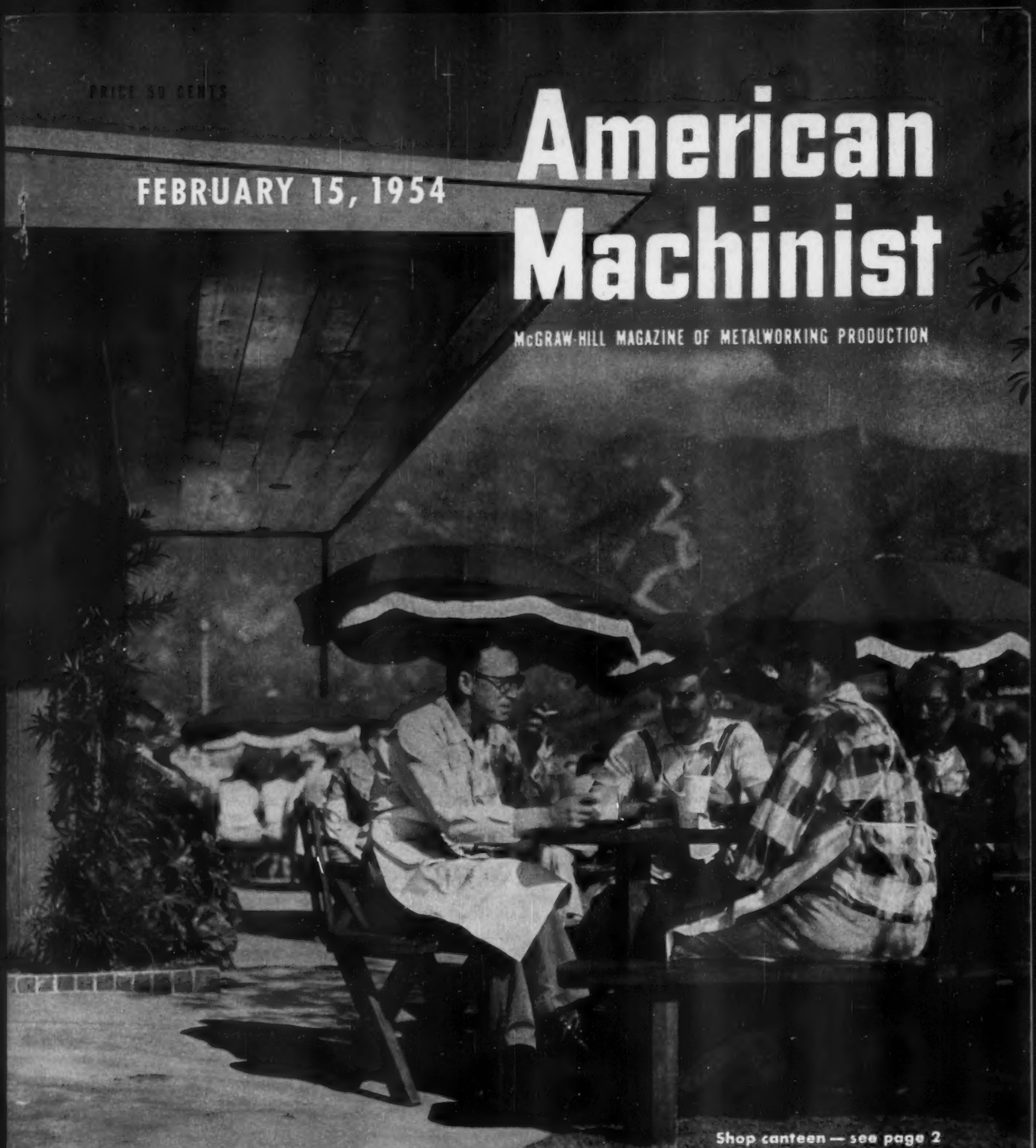

Shop canteen — see page 2

Subcontracting Procedure - SPECIAL REPORT

How to Design and Use Special Machines

The mooring mast that was never used!

IN MID MANHATTAN there stands a monument to a dream. A 1250-foot mooring mast that was never used!

When the Empire State Building was designed, the huge rigid-frame dirigible looked like the coming thing in air transportation. So, atop the world's tallest building, they placed a giant mooring mast. Yet before the building was finished, so was the dirigible balloon!

Why? It was knocked out of the race by the oldest law on the books. Darwin called it the survival of the fittest. We call it competition, but it means the same thing. In today's highly competitive market, it means that new ways *must be found* to produce a higher quality product, at lower cost.

That's where latest Heald equipment and a fresh Heald viewpoint can help you come out ahead in the struggle for survival. Long runs or short, single or multi-purpose setups, Heald machines provide a sure way to improve product quality, speed production and cut unit costs.

Competition is wonderful if you're *ahead* of it. Our business is to help keep you there. That's why IT PAYS TO COME TO HEALD.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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chips

DE-BRRED... Consolidated Engrg Corp, Pasadena, Calif, maker of analytical electronic instruments, is in a natural basin between the Sierra Madre mountains to the north and a bluff to the south. Low, attractive, buildings of contemporary design are set in an extensive landscaped area like a campus. More than 1000 workers enter the plant through the canteen area pictured on our cover, which they also use for coffee breaks, lunches, meetings, clubs, and recreation. Stockholders meet there too. Music through a public-address system, rustic redwood tables with umbrellas, and a commissary are provided. Easterners will find wry midwinter pleasure in the fact that the photographer waited several weeks to take this picture—until the smog finally was dispersed into the Mojave Desert nearby. The plant has just won an Industrial Landscaping Award.

SPECIAL MACHINES... Robert L Kessler, master mechanic of Delco-Remy, has listed the 14 points to be considered in screening ideas for special machines, major factors to be considered, and the information management wants about the project. It makes our lead article . . . Also in four pages is a review of Communist-built machine tools shown at the Leipzig Fair, particularly of Czechoslovak origin.

CO_2 AGAIN... Don't miss the latest from Britain—cooling a tool from the inside. There are also new types of containers for liquid CO_2 the larger one served by tank truck.

GRINDING... To follow up our earlier articles, we give you the latest progress report on electrolytic grinding, this time by Dr N W Thibault and B H Anderson of Norton Company. Tests at various plants show the process will grind carbides commercially, and a single-unit power supply can be easily installed. Diamond savings average 75% . . . Abrasive-belt finishing has been applied to auto brake disks with simple fixturing; we give you the story in a picture page.

FOR MANAGEMENT... To put the data on the record, George E Fouch, mgr of Subcontract Operations, tells how GE coordinates subcontracting for Evendale in our 8-page Special Report. Systems, allocation control, inspection and contract placing are included . . . Also for management is Howard Gresens' description of the program for developing technicians to engineering status and PE license, as worked out at Airborne Instruments Lab, where he is personnel manager.

TOOLING... Re-entrant shapes can be spun around a Cerrobase chuck that's later melted out. A 3-page Purdue story tells how . . . There's also more from Hewlett-Packard on the making of "electron plumbing" —wave guides and such . . . Other stories cover conversion of a screw machine for drilling . . . There's Stanley Cope's No. 9 on dies, too.

COMING... Mar 1 *AM* will have a short but pertinent Special Report on Realistic Depreciation, plus articles on cutting fluids, the standard minute, drill research, and three articles on unusual tooling. The cover will picture a special finishing machine for Ford.

C A NICHOLS, director of facilities since Nov, '53, of the Delco-Remy Division of General Motors, Anderson, Ind, is a graduate of Carnegie Institute. He started with Delco-Remy in 1923 as a student engineer. Serving first as a plant foreman, he later was placed on special assignment. In 1927, he directed installation of the Plant Five gray-iron foundry, one of the first permanent-mold foundries in the world. Mr Nichols served as superintendent there until 1930 when he was assigned to the Process Engineering staff. As process engineer and later master mechanic, he had a major responsibility in the shift to war production in World War II, and later retooling for civilian production.

Mr Nichols was named Delco-Remy Coordinator of Defence Production in April, 1951, and factory manager in charge of jet-aircraft engine components production on Aug 1, 1952. He now has staff responsibility for activities of the Master Mechanic, Process Engineering and Tooling sections.

New 2 GLEASON TESTERS

For COMPLETE CHECKING ✓ of Small Gears

NO. 104 SPUR GEAR TESTER
for spur, helical, and internal gears up to 4½" center distance.

✓ *A ROLLING TEST for composite error, recorded in chart forms.*

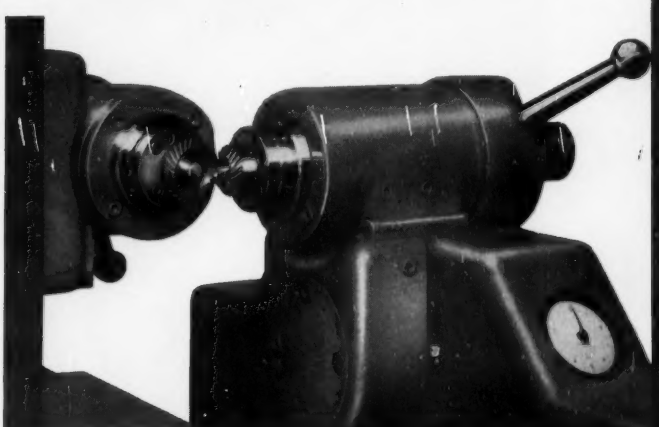
✓ *A RUNNING TEST under actual operating speeds and loads.*

For complete inspection of all small gears, use both types of test. The recorded rolling test shows an exact measurement of total error, including profile, spacing, and eccentricity effects. The power running test shows how the gears perform under actual operating conditions, and permits visual inspection of tooth contact pattern.

Note these provisions for making both types of check *on the same tester:*

For the RECORDING TEST
- 1/50 HP drive at 7.2 RPM
- Pressure between gears adjustable by 4 oz. increments, up to 5 lbs.
- Detachable electronic recorder with 5-stage variable magnification

For the RUNNING TEST
- ¼ HP drive
- Drive spindle speeds up to 14,000 RPM
- Precise load control by electric braking



NO. 104 ANGULAR HYPOID TESTER
for bevel and hypoid gears up to 4¼" diameter.

***WRITE FOR FULL INFORMATION** on how these new testers will improve your small gear inspection.*

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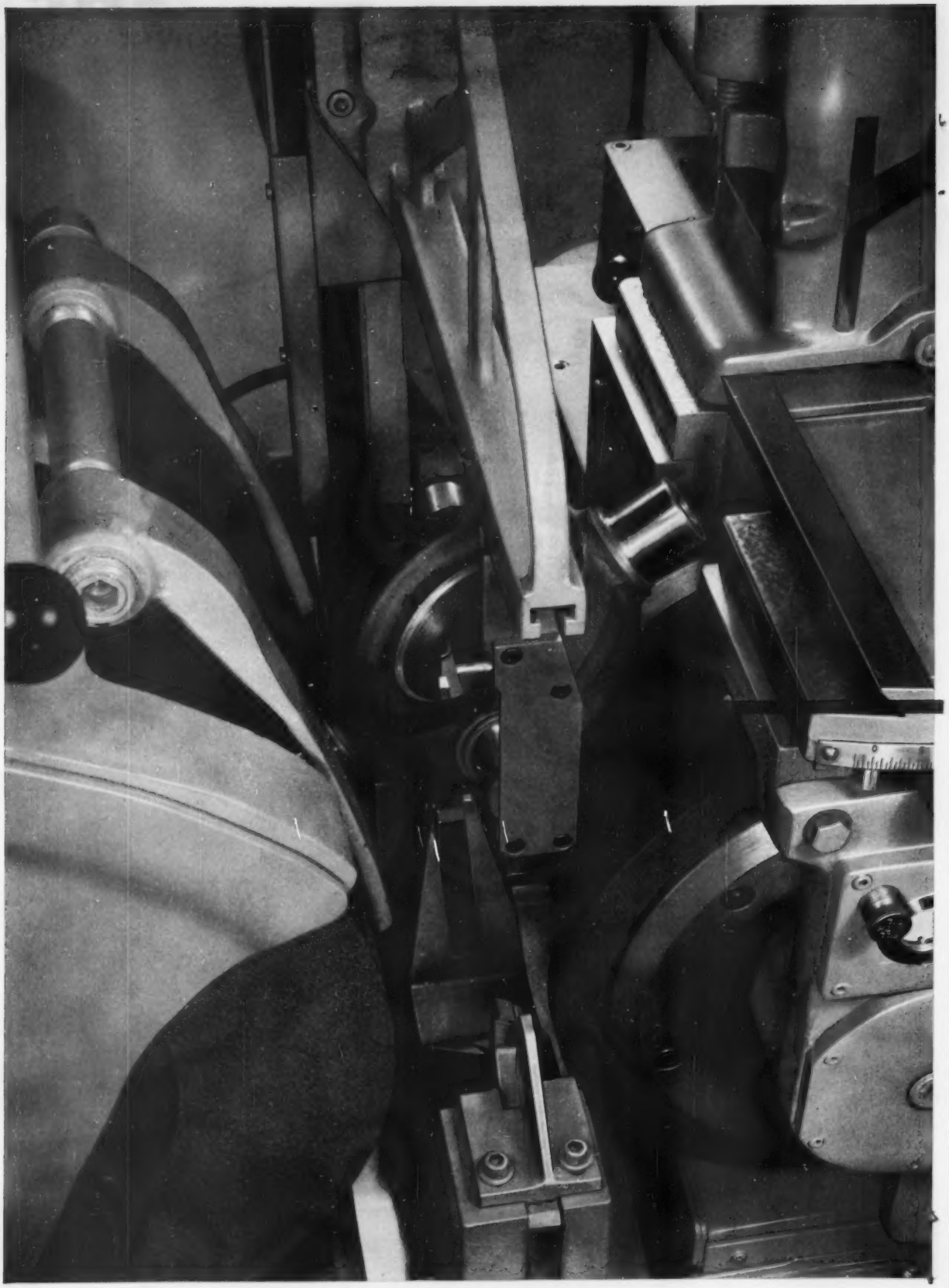


CINCINNATI FILMATIC No. 3 CENTERLESS

Grinds Two Diameters Requiring 7X Swing

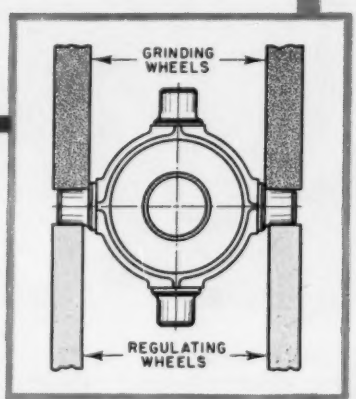
New applications for CINCINNATI Centerless Grinders are always popping up. The latest is illustrated here . . . a two-wheel setup to grind simultaneously two trunnion diameters on universal joint spiders. Swing required for the center section is approximately 7 times the ground diameters. ¶Cincinnati Application Engineers tooled up a CINCINNATI FILMATIC No. 3 Centerless Grinding Machine for the job. Equipment includes profile hydraulic truing units over the grinding and regulating wheels; special grinding wheel guard and regulating wheel housing to permit loading; automatic infeed attachment; hydraulically operated loading fixture; manually operated grinding wheel spindle reciprocating attachment. With the latter attachment, the operator touches up the shoulder and radius adjacent to the ground diameters. ¶You probably have precision grinding operations in your shop that could be centerless ground on a CINCINNATI at lower cost. It will pay you to reconsider your present methods, and our Application Engineers will help you decide. Meanwhile, you may obtain the CINCINNATI Centerless literature of your choice by writing to the address below. Illustrations and brief specifications in Sweet's Machine Tool Catalog.

CINCINNATI GRINDERS INCORPORATED

(Subsidiary of The Cincinnati Milling Machine Co.)

CINCINNATI 9, OHIO

CINCINNATI FILMATIC No. 3 Centerless Grinding Machine. You may obtain complete specifications by writing for catalog No. G-570-3.



Drawing of part and arrangement of wheels. Two diameters are ground simultaneously, removing .015", .008", and .003" in three operations, on a CINCINNATI FILMATIC No. 3 Centerless Grinding Machine tooled up by Cincinnati Application Engineers.

Cincinnati Offers the Only Complete Line of Centerless Grinding Machines

No. 0
Catalog No. G-576-2

No. 2
Catalog No. G-611-1

No. 3
Catalog No. G-570-3

No. 4
Catalog No. G-538-2

No. 5
Data on request

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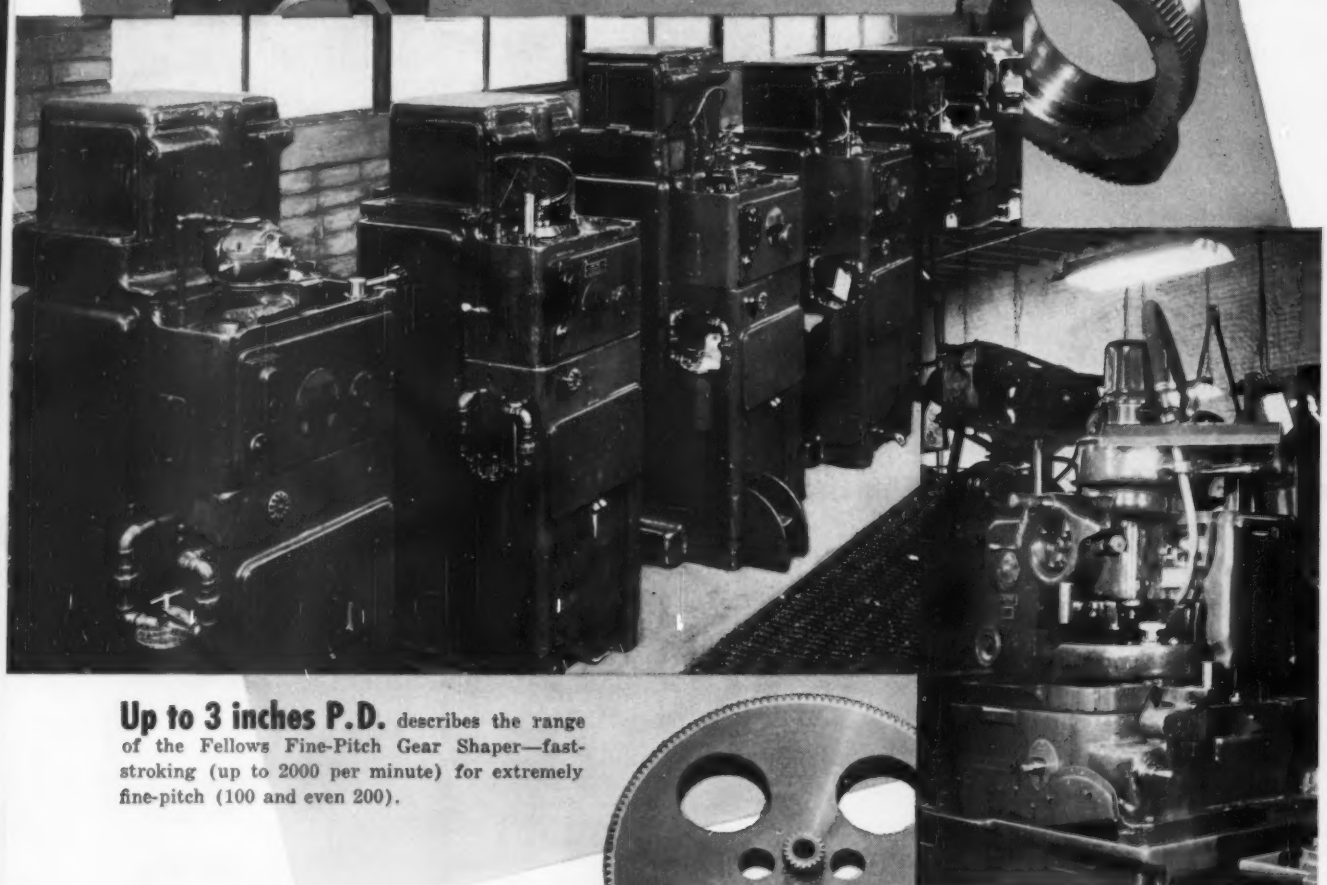
CINCINNATI

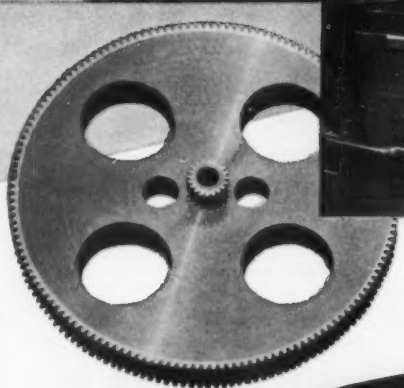
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

FINE PITCH

THE FELLOWS

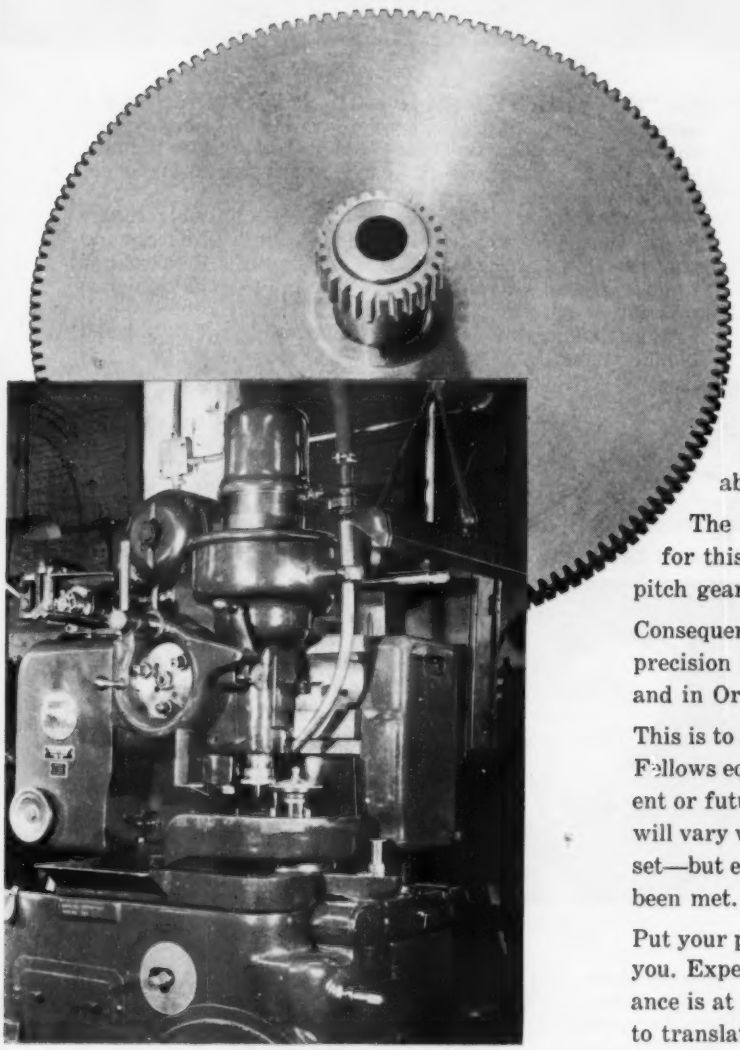


Up to 3 inches P.D. describes the range of the Fellows Fine-Pitch Gear Shaper—fast-stroking (up to 2000 per minute) for extremely fine-pitch (100 and even 200).



THE *Fellows*

METHOD FOR ALL SIZES OF *fine pitch* GEARS



Over 3 inches P.D. the Fellows 7-Type Gear Shaper extends range on fine-pitch work to 7 inches. Unparalleled versatility and quick change-over sets your shop up for economical small-lot jobs as well.

Automation—the instrument control of manufacture—ushers in a Second Industrial Revolution. It is all about us, already!

The *super-precision* of control instruments for this new 'age' requires *quality* in the fine-pitch gear components.

Consequently there is really no substitute for the precision inherent in the Gear Shaper Method—and in Original Fellows Cutters.

This is to remind all in the instrument world that Fellows equipment covers the size-range for present or future design requirements. Cost per piece will vary with the closeness of the tolerance limits set—but even the most precise specifications have been met.

Put your problem up to the Fellows Office nearest you. Experienced, intelligent, cooperative assistance is at your command—and also the machines to translate promise into performance.

GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.
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Announcing The VAN NORMAN No. 38M Miller

One of 10 New Ram Type Models Especially Designed to Give You Greater "Flex-ability" and "Cut-ability"

For "CUT-ABILITY", the 10 HP spindle motor drives the cutterhead only . . . provides ample power for every type of milling cut. The new box type column and base plus the new heavy knee, saddle and table assemblies assure maximum rigidity and accuracy.

For "FLEX-ABILITY", the new heavy adjustable cutterhead, new larger extended ram and heavy knee with front and rear directional power and manual feed controls. Ram extends to its maximum range of 29". New design permits maximum cuts within entire ram range.

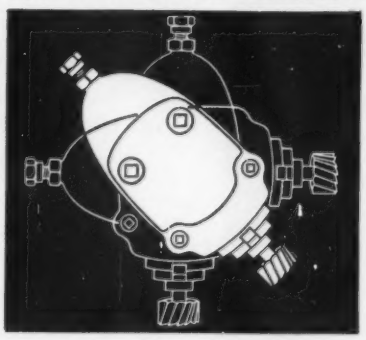
Write for complete details on the new, modern Van Norman No. 38M Ram Type Milling Machine.

No. 38 M

Table: 64" x 14"
Spindle Motor: 10 HP
Feed Motor: 1½ HP

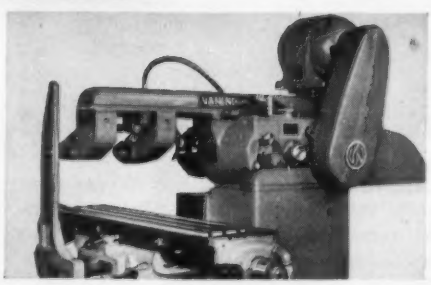
Interested in Extra Vertical and Table Range: See Your Van Norman Dealer

LOOK AT THESE "PLUS" FEATURES FOR MAXIMUM "FLEX-ABILITY"



Adjustable cutterhead permits horizontal, angular and vertical milling on one machine. Reduces work reset-ups, eliminates idle machine time.

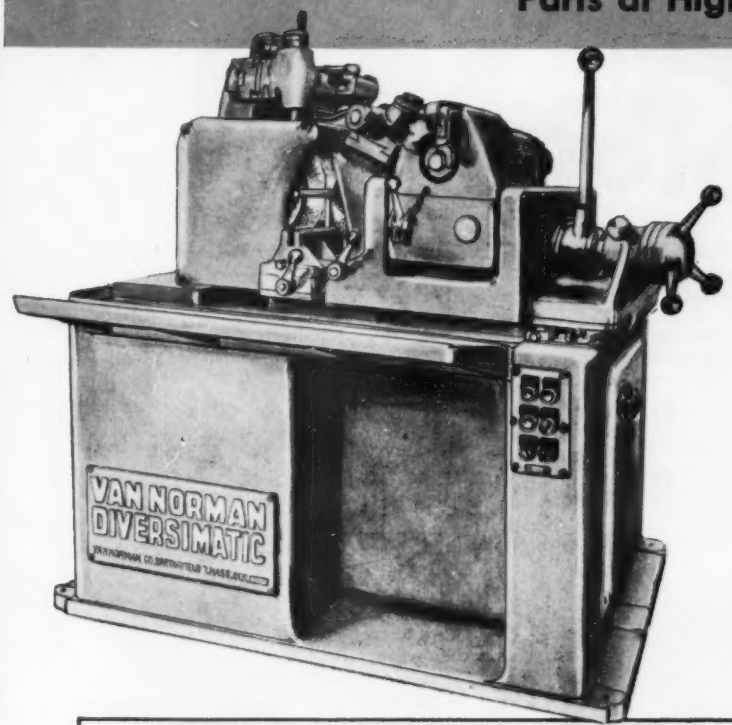
Machine shown with overarm, arbor supports, and outerbrace.



VAN NORMAN makers of—Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

New Van Norman *Diversimatic*® Centerless Grinder

Gives "Close-Tolerance" Grinding of Small Parts at High Production Rates



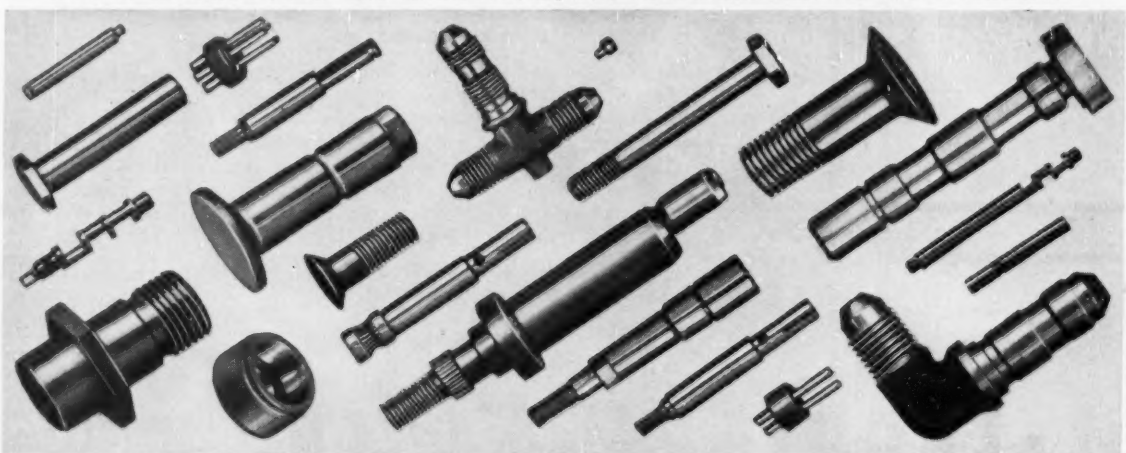
This new grinder provides fine finish to close tolerances at high production rates. It finish grinds parts from solid . . . or finish grinds rough-turned pieces. When equipped with a Crush Forming Attachment, it form grinds and does profile work.

These Diversimatic® Features Cut Grinding Costs!

- Heavy Duty grinding wheel is mounted on double-row super precision ball and roller bearings, sealed and lubricated for life, assuring trouble-free operation.
- Spindle requires no warm-up period.
- Grinding wheel and regulating wheel dressers hydraulically-operated.
- Infinitely variable ¼ h.p. regulating wheel drive, 15 to 800 r.p.m.

Get the full facts. See how this versatile grinder can cut your grinding costs on small shafts, formed shapes, parts of two or more diameters or special contours.

CENTERLESS GRIND PARTS LIKE THESE FASTER, MORE ECONOMICALLY ON THE DIVERSIMATIC



VAN NORMAN CO., Springfield 7, Mass.

Improved LANROLL Attachment for Precision Thread Rolling on Automatics

Important improvements for economical thread rolling to Class 4 limits have resulted from changes in the design and construction of the LANROLL Attachment for automatic screw machines.

These improvements, which insure a degree of stabilization between the workpiece and the attachment never previously obtained in a tool of this type, provide:

(1) A well-balanced micro structure of the workpiece through reduced sidewise pressures between the rolls and threads produced.
(2) Low gear-tooth and thrust-bearing loads.
(3) Thread rolling solid to the shoulder with no danger of roll damage.
(4) Longer roll life as rolling wear is distributed equally between the two rolls.
(5) Precision rolling of coarse pitch threads to Class 4 fit without drunkenness.

The improved LANROLL Attachment is furnished in two sizes: the #18 Attachment to permit rolling of #5-44 pitch to ½"—13 pitch threads up to $1\frac{3}{16}$" in length; and #20 Attachment for rolling ⅜" —24 pitch to 1"—8 pitch threads up to $1\frac{5}{16}$" in length. A new system of size adjustment assures operation of the Attachment for every size within its range as though it were exclusively engineered for the particular workpiece being threaded.

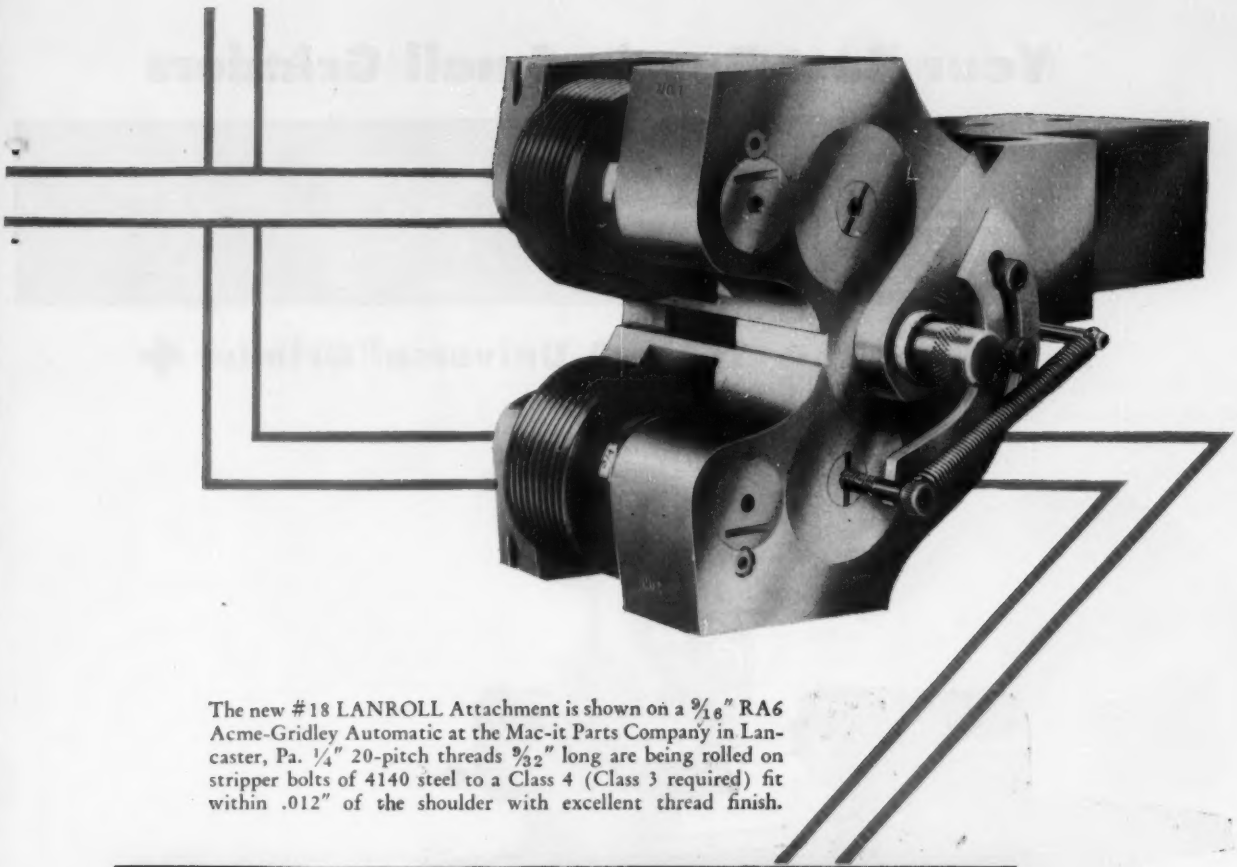
The improved LANROLL Attachment has other important new features: *Attachment Tipping* to avoid indexing interference, allowing a more rugged construction and the use of larger rolls, resulting in an increased number of starts and longer roll life; *Precise Timing* to avoid experimentation or near-guess timing which may result in damage to the rolls on initial rolling; *Adjustment for Taper*, to eliminate any taper which may occur, that can be made without removing the Attachment from the machine.

More complete information will be sent on request. Please send specifications when writing.

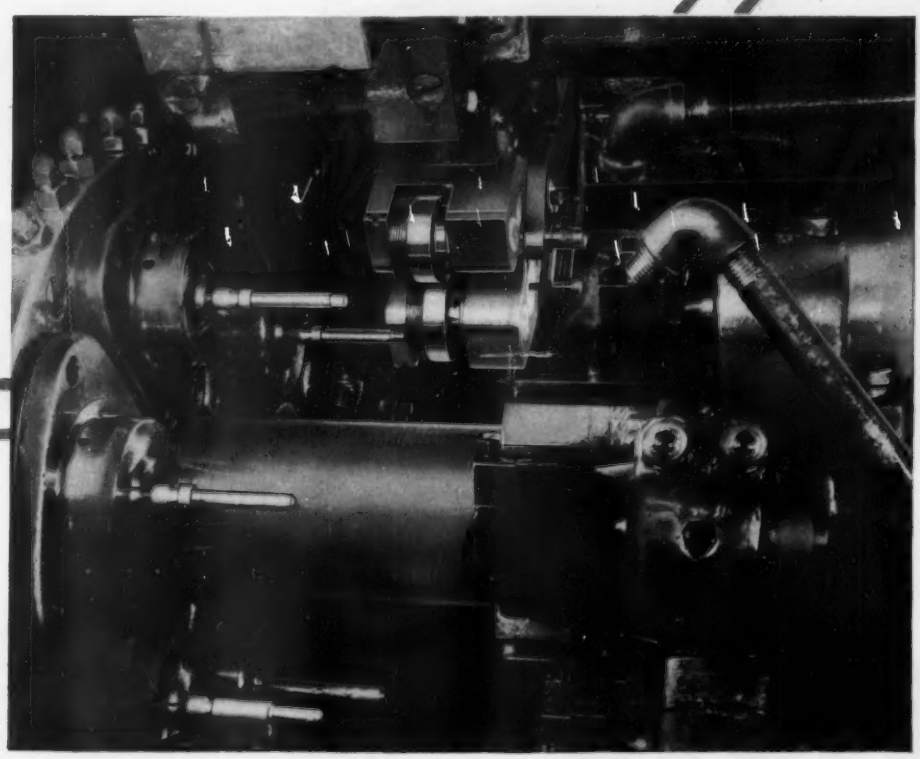
• LANDIS *Machine* CO.
• WAYNESBORO PENNSYLVANIA •

see this
EQUIPMENT
at the
ASTE
Show
BOOTH 1738

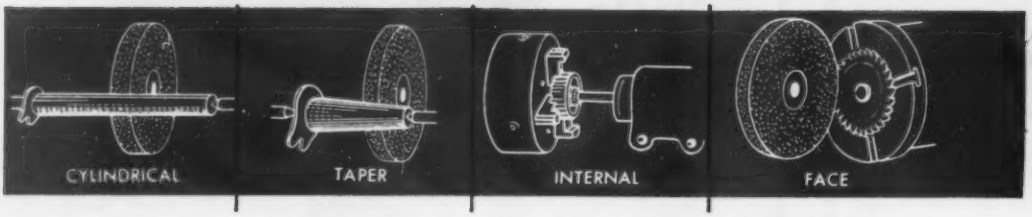
379-C



The new #18 LANROLL Attachment is shown on a $^{9}/_{16}$" RA6 Acme-Gridley Automatic at the Mac-it Parts Company in Lancaster, Pa. $^{1}/_{4}$" 20-pitch threads $^{9}/_{32}$" long are being rolled on stripper bolts of 4140 steel to a Class 4 (Class 3 required) fit within .012" of the shoulder with excellent thread finish.



Your Best Buy in Small Grinders



A Universal Grinder +

167

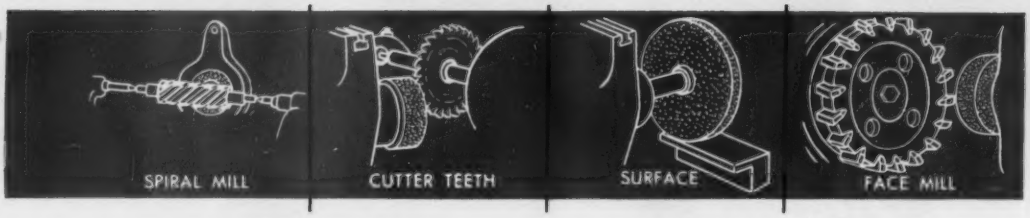
Landis 12" x 28"
Universal and Tool Grinder

LANDIS

precision grinders

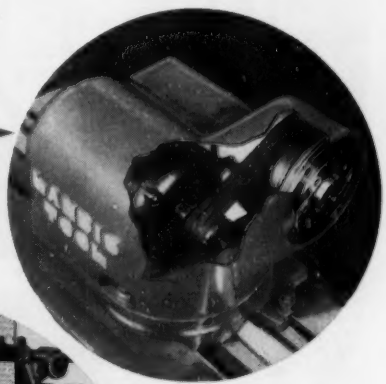
Write for Catalog K-53 for full information on the 24 different grinding operations that can be performed on this versatile machine both as a universal grinder and as a tool grinder. In includes specifications and features of this machine together with setup pictures of typical grinding operations.

2 machines in one—at low capital investment



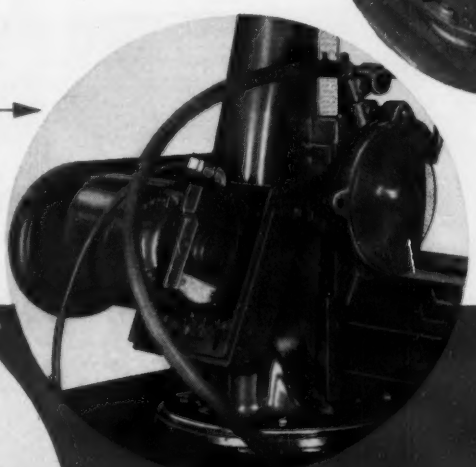
A Tool Grinder

You really get two machines in one with the Landis 12" x 28" Universal & Tool—an ideal one machine grinding department for the tool room or small shop at a big saving in capital investment over separate machines.



COMPACT ALL VEE-BELT HEADSTOCK

Low compact headstock particularly good for face grinding operations. All Vee-belt drive assures smooth power and fine finishes. Only two revolving parts; the electric motor and face plate or spindle.



RIGID MOTOR MOUNTING ON MASSIVE COLUMN

The motor is adjustable for changing belt tension. Column made with heavy sections, well ribbed. Vertical ways protected under wheel head by telescoping guides.

SPECIALLY DESIGNED FOR WET OR DRY GRINDING

The coolant tank and drain troughs are integral parts of the bed casting. All operating mechanisms are thoroughly protected to eliminate abrasive material resulting from dry grinding operations.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U.S.A.

GIDDINGS & LEW
HYPRO

Photo courtesy of
TEMCO Aircraft Corporation
Dallas, Texas

Metal Surgeon...

with a flair for general practice

Performing with speed and precision this G & L Openside Planer gives you a highly versatile tool to handle both common and uncommon work with equal efficiency

Productive flexibility . . . that's one of the many big advantages of using a G&L Planer such as this Hypro Openside machine. Whether it's a simple or complex job . . . long or short run . . . big or small workpiece—this versatile machine completes it in minimum time with a minimum of setups.

Its openside construction allows you to handle workpieces up to 120 inches in width. Table lengths can be furnished in the proper size you need, and horsepowers range up to 100. Smooth, responsive control minimizes tool breakage, and outstanding rigidity allows holding tolerances within ten-thousandths.

For complete information on the G&L line of Openside or Double Housing Planers, see your representative or write —

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools—Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools

THE Van Keuren GEAR MEASURING SYSTEM

Set 26EX—Gear Measuring Wires, accurate to ± .000025", for common diametral pitch external spur gears.

VAN KEUREN GEAR MEASURING WIRES PROVIDE THE MOST ACCURATE AND LOW COST METHOD OF MEASURING THE TOOTH THICKNESS OF SPUR AND HELICAL GEARS, INVOLUTE SPLINES AND INVOLUTE SERRATIONS.

ONLY . . . EQUIPMENT NEEDED:

1—SET VK MEASURING WIRES
1—MEASURING INSTRUMENT

Complete information regarding the use of Gear Measuring Wires is contained in a 50-page section of the Van Keuren CATALOG and HANDBOOK No. 35. Included in this section are:

- . . . table of wire sizes for the 1.92", 1.728", 1.68" and 1.44" series.
- . . . tables of wire measurement including change factors for standard external and internal spur gears of 14½°, 17½°, 20°, 25°, and 30° pressure angles and of from 5 to 500 teeth.
- . . . table of relationships between depth of cut and tooth thickness for common pressure angle gears.
- . . . definitions and exact formulas covering involute spur gears.
- . . . tables of involute tooth parts for standard addendum and stub tooth involute gears.
- . . . information, formulas and examples regarding the wire measurement of helical gears.
- . . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.
- . . . tables of wire measurement for involute splines.
- . . . tables of wire measurement for involute serrations.
- . . . tables of comparative measurement over three sizes of wires for use in involute profile checking.

CATALOG and HANDBOOK No. 35 is available without charge by writing to: The Van Keuren Co., 173 Waltham St., Watertown, Mass. Ask for your copy.

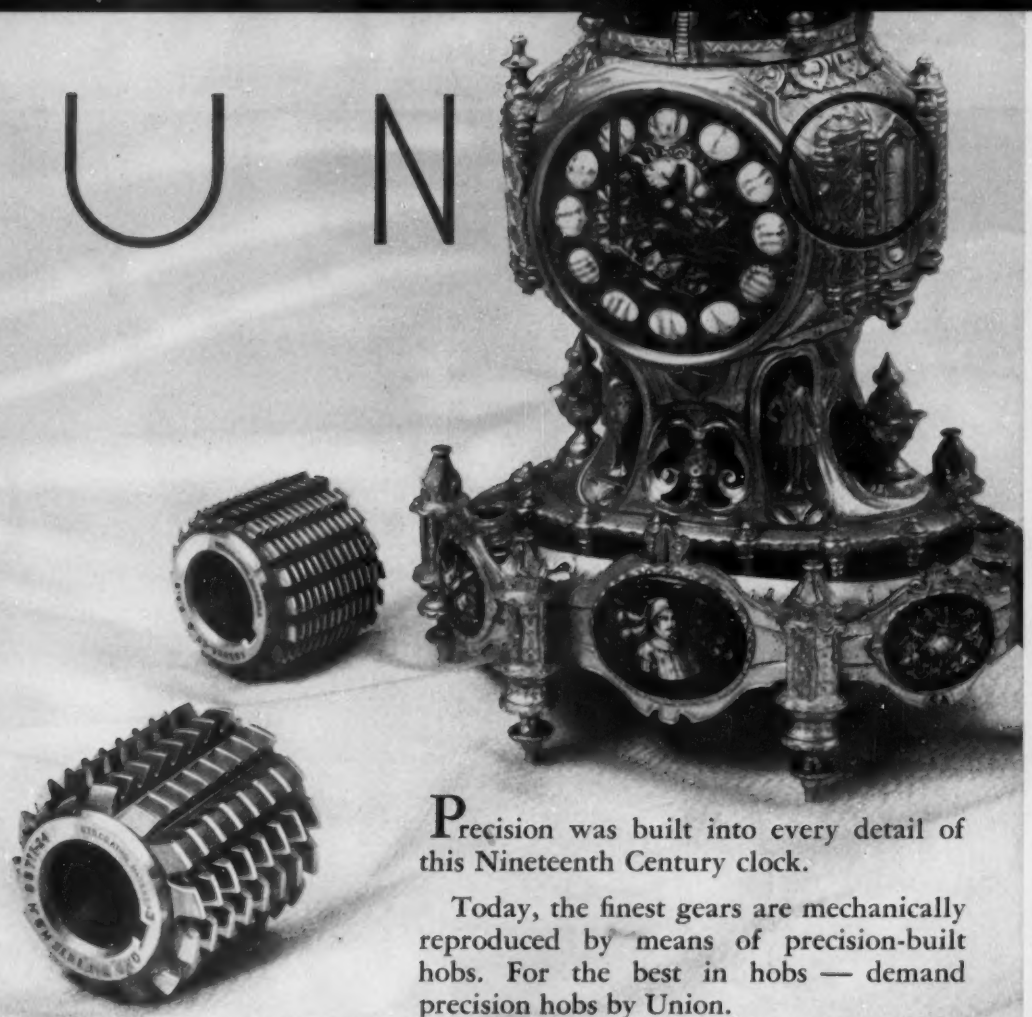
VK
35th YEAR

THE Van Keuren CO.

173 WALTHAM STREET, WATERTOWN, MASS.

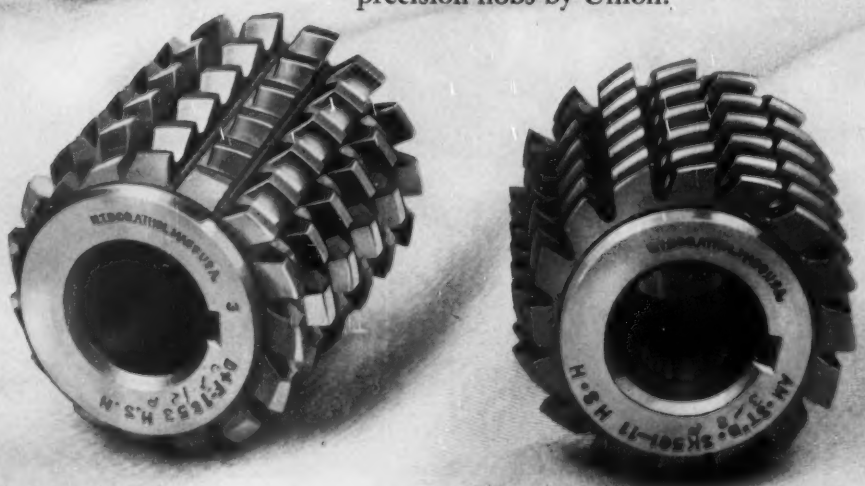
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

U N I O N



Precision was built into every detail of this Nineteenth Century clock.

Today, the finest gears are mechanically reproduced by means of precision-built hobs. For the best in hobs — demand precision hobs by Union.



Renaissance 19th Century French Clock, made in Paris by RAINGO, *Circa* 1840

HOBS

Involute Spline
Parallel Spline
Worm Gear
Tangential
Spur Gear
Helical Gear
Ground
Unground
Accurate Unground
Finishing
Roughing
Preshave
Protuberance
Stub-Tooth
Standard Gear
Composite Form
Combination Pitch
Topping
Semi-Topping
Non-Topping
Herringbone Gear
Shank Type
Shell Type
Serration
Square Shaft
Tapered Hole
Multiple Thread
Special Shape

SPROCKET

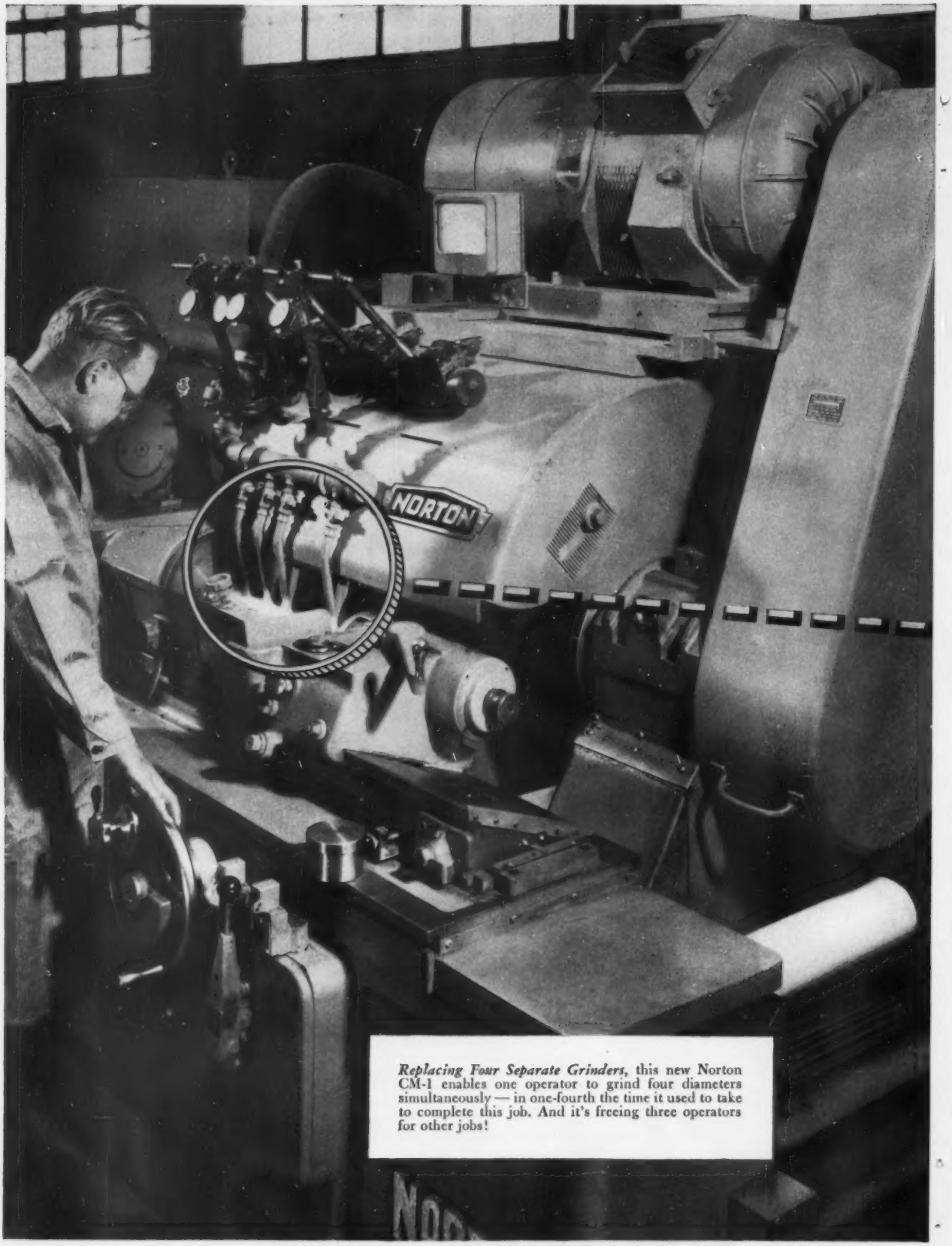
Silent Chain
Roller Chain
Special

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

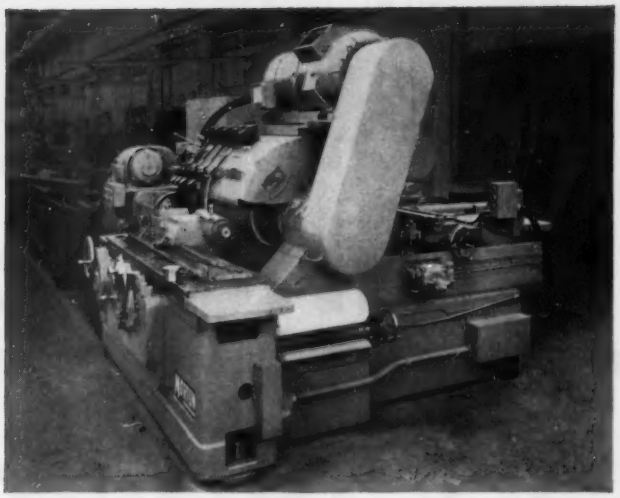
Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

CUT INVENTORY COSTS, ORDER FROM YOUR LOCAL DISTRIBUTOR



Replacing Four Separate Grinders, this new Norton CM-1 enables one operator to grind four diameters simultaneously — in one-fourth the time it used to take to complete this job. And it's freeing three operators for other jobs!



A Great New Production Tool. The Norton Type CM-1 Heavy Duty Semi-automatic Multi-Wheel Grinder brings new efficiency and economy to the grinding of parts having multi-diameters—such as crank and cam-shafts, transmission and motor shafts, etc.

Here's a new Norton Grinder to

boost your production rate

Type CM-1 Heavy Duty Multi-Wheel Grinder does four or more jobs at once, reduces capital investment, cuts operating time and costs

When you can get one machine that does the work of several, in a fraction of the working time, you save considerably on purchase costs, on operating costs, and on floor space.

That machine is now ready to go to work for you. The new Norton CM-1 makes four or more cuts in a single plunge-grind cycle, operating automatically under one-lever control. And it completes each separate grinding operation with the accurate, trouble-free performance that's built into every Norton grinding machine.

Typical Advanced Features

- Cartridge type bearings at each end of heavy, 12″-diameter wheel spindle assure extreme rigidity of spindle, longer wheel life, greater accuracy and control with minimum truing.
- **Automatic truing device — in rear, out of operator's way — trues straight or formed wheels each individually, yet all at once, thus requiring only the amount of time needed to true widest wheel.**
- Automatic compensation for collective wheel wear, including amount trued off. No adjustment or resetting of wheel needed after truing.
- **Optional equipment includes built in automatic sludge remover and coolant filter, constant peripheral wheel speed control, increased power for wheel or work drive, etc.**

Why not get the complete story of how the CM-1 can benefit your grinding operations? See your Norton Representative, or write us direct. And remember: only Norton offers you such long experience in both grinding wheels and machines to bring you the "Touch of Gold" — to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

***To Economize, Modernize With* NEW**

NORTON

GRINDERS and LAPPERS

Making better products... to make other products better

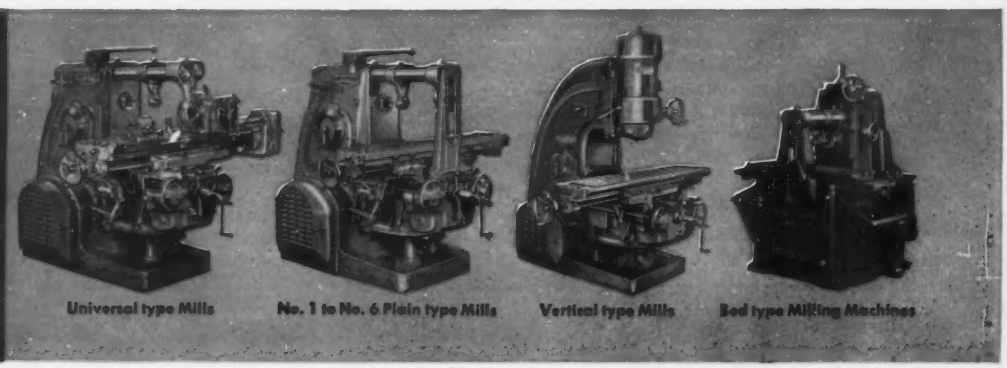
District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit

Announcing

KEARNEY & TRECKER'S TOOL-LEASE PROGRAM

The most significant opportunity ever offered machine tool users!

Here are a few of the many new Kearney & Trecker machines available for Tool-Leasing



NOW... you can rent new Kearney & Trecker machine tools!

Here's what that means to you—

TOOL-LEASE ALLOWS YOU TO—

- ✓expand production without tying up working capital
- ✓stay free of long term investments
- ✓remain debt free
- ✓avoid the risk of high obsolescence
- ✓be unrestricted by creditor's limitations
- ✓keep future borrowing capacity unimpaired
- ✓simplify your financial structure
- ✓obtain optimum efficiency, flexibility and capacity to meet constantly changing production requirements.
- ✓try out, in effect, new machines... without having to buy them

TOOL-LEASE HELPS YOU GET THE EXACT TOOLS FOR THE JOB—

Under Kearney & Trecker's Tool-Lease Program, you may obtain any standard Kearney & Trecker machine tool. This includes: standard knee-type and bed-type milling machines and precision boring machines. Special lease agreements will be considered where either special machinery or applications of heavy-duty CSM bed-types are required.

TOOL-LEASE GIVES YOU 3 PLANS TO CHOOSE FROM—

The basic Tool-Lease Program gives you a choice of three plans with varying options to terminate the lease, continue the lease or purchase the equipment. Depending upon the plan selected, equipment may be leased for one, two or three or more years.

Your Kearney & Trecker representative will be pleased to give you specific Tool-Lease information and help you analyze your machine tool needs... suggest the equipment that will best help you solve your production problems. Write, wire or phone Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

TOOL LEASE
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS
EQUIPMENT ®

©1954

Fill out and attach coupon to your letterhead and mail for Tool-Lease Bulletin.

Rotary Head Milling Machines — Automatic Precision Boring Machines

Kearney & Trecker Corporation
6784 W. National Ave.
Milwaukee 14, Wis.

Please send me Bulletin TL-10A with details on the Tool-Lease Program.
☐ Check here if you would like to have a representative call on you as soon as possible (or call Milwaukee, GReenfield 6-8300).

Name.....

Title.....

Company.....

Address.....

City.....Zone.....State.....

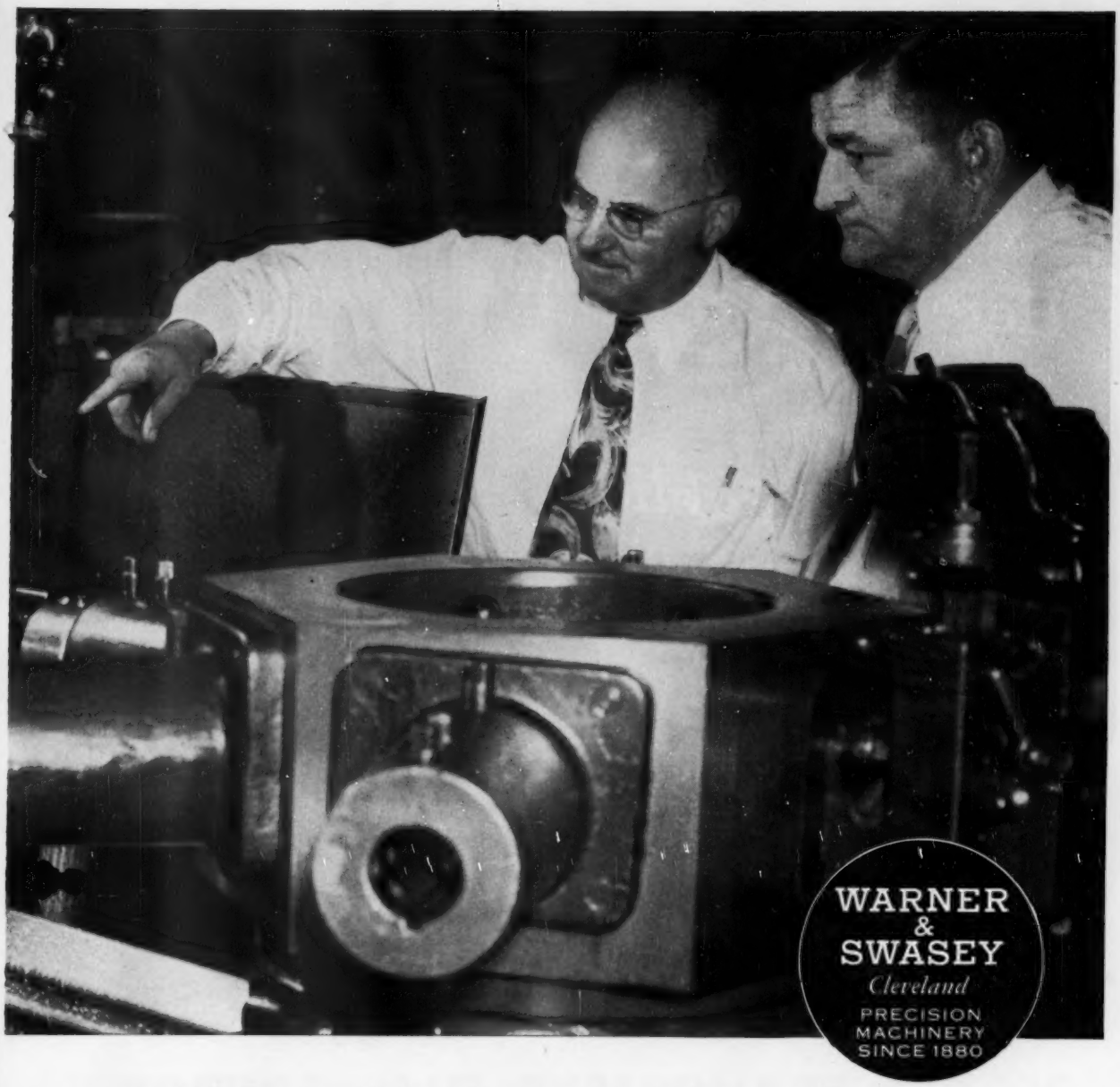
Built right— Sold right

• Warner & Swasey Machine Tools have established enviable records for high productivity, low maintenance and minimum downtime. They've *proved* their dependability—holding their accuracy for years after they have paid for themselves. They're *built right!*

Warner & Swasey's principle of design plays an important role in this success. Each model is *individually designed*—from the floor up—to handle a *specific range of work.* Machine handling time is thus minimized.

Skilled craftsmen, working to exacting

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &



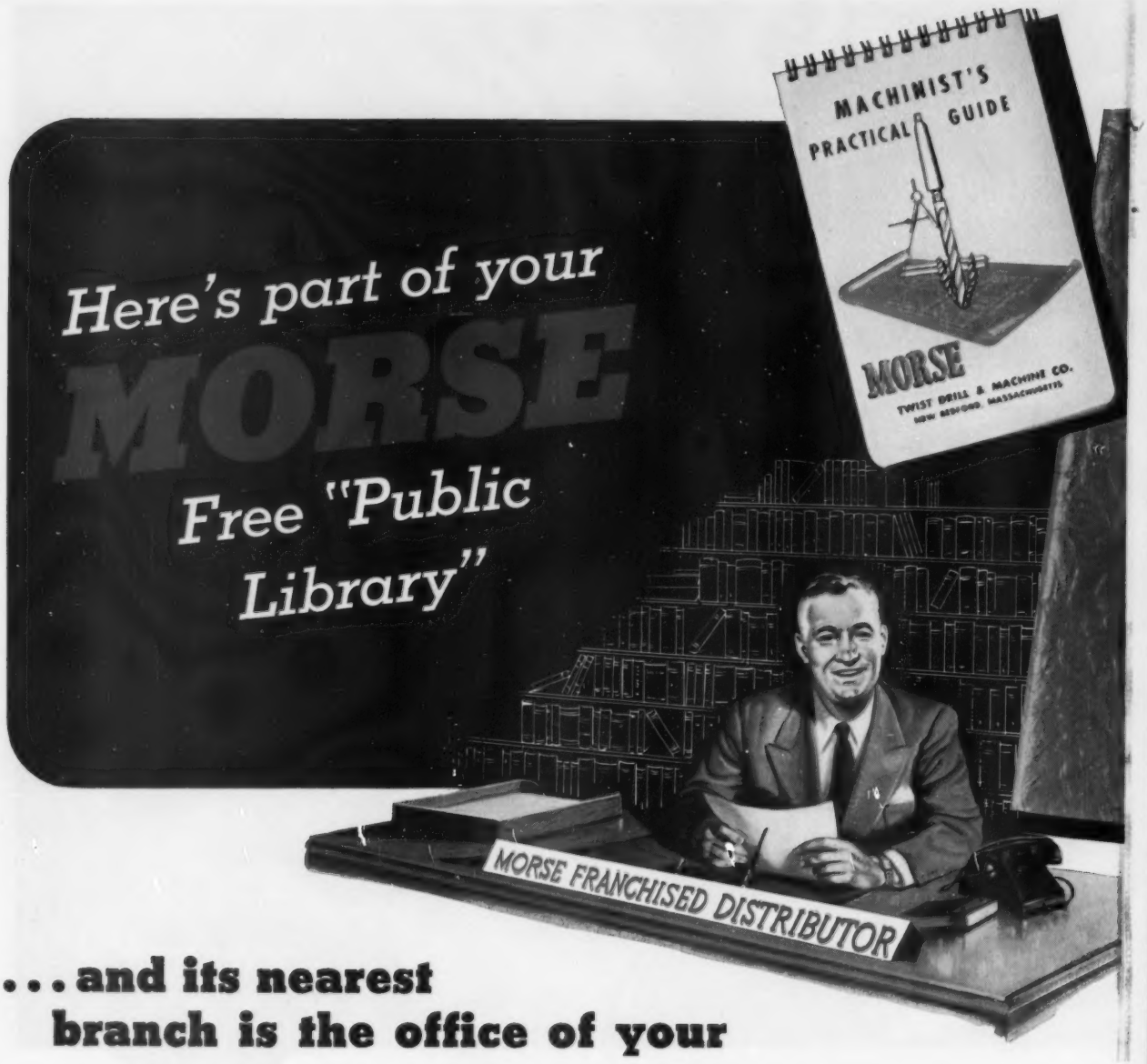
Warner & Swasey standards, combine the most modern machines and processes with certain time-honored hand techniques . . . so necessary to insure the traditional Warner & Swasey accuracy.

And Warner & Swaseys are *sold right!* By turning specialists who follow a rigid Warner & Swasey policy—that they recommend and sell a machine *only* when it completely fulfills the requirements of your particular work.

These turning specialists are also at your service long *after* the order is written. Your nearest resident Field Representative, one of 47 located throughout the country, is quickly available to you. He's ready to lend his training and experience to help you *maintain* the high productivity of the Warner & Swaseys in your plant.

So whatever your turning needs—whether it's a machine for a specific job, or if you're looking for greater production through modernization . . . call in your nearest Warner & Swasey Field Representative.

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY



. . . and its nearest branch is the office of your

MORSE-FRANCHISED DISTRIBUTOR

Yes, he's your "librarian" for the most useful collection of books in the cutting tool industry. Just as he is your most competent counsel in any problem involving drills, taps, dies, reamers, end mills, counterbores or milling cutters . . . regular or Electrolized.

Ask him for any or all of these useful books . . . *they're free.* And remember that he's best qualified to get you top return for your cutting-tool dollar . . . because he handles and knows the best of all cutting-tool lines . . . MORSE.

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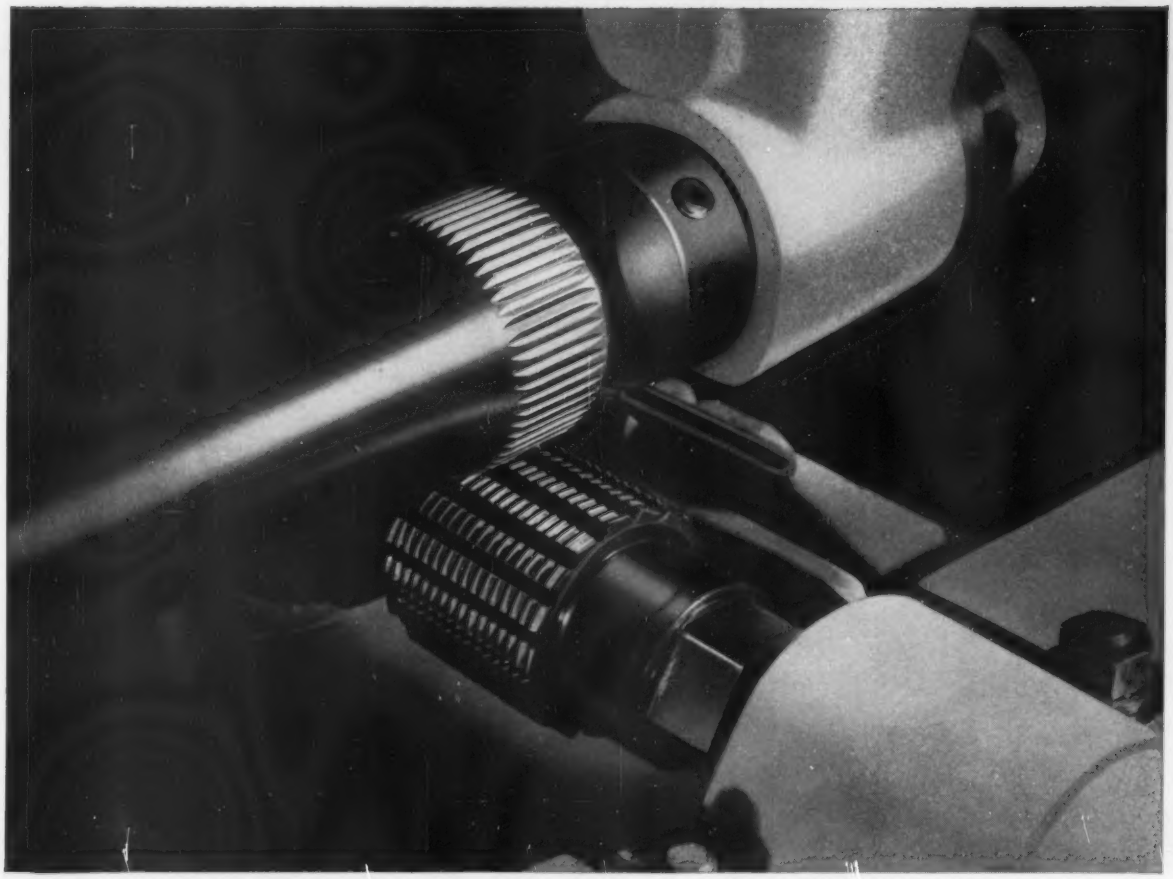
Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time



Barber-Colman HOBBING

DOUBLES TOOL LIFE • CUTS PRODUCTION TIME

HARD STEEL TORSION BARS,
45-50 R. C.

Hobbing tough, hard materials — such as this torsion bar job — presents no special production problems when you use the Engineered Hobbing approach.

These torsion bars, 45-50 Rockwell "C", approach the upper limit of machineability for hobbing. Structure and toughness of the material caused hob teeth to wear rapidly.

Barber-Colman Hobbing Engineers worked closely with production officials in this plant to produce the desired results on this job. Substantial tool savings, increased tool life, and better production time resulted. Total hob life has increased from approximately 600 to over 1200 ends.

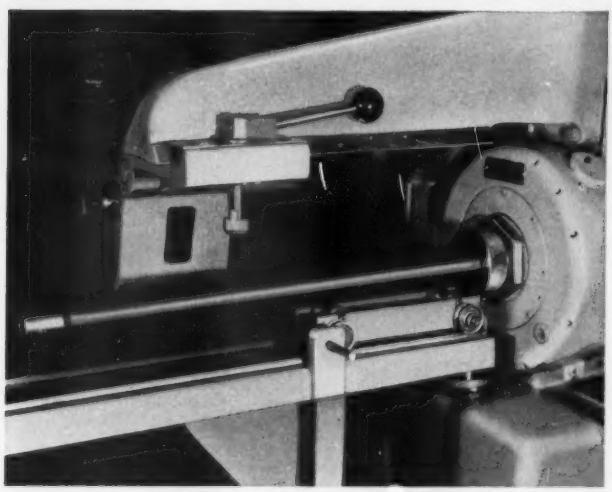
BUILDERS OF PRECISION GEAR

TOOL COSTS REDUCED WITH CLASS C ACCURATE UNGROUND HOBS

Barber-Colman engineers recommended 4-thread Class C Accurate Unground Hobs and automatic hob shifting to increase tool life and production in this hard material. Results showed an average increase from 65 to 120 hobbed ends per hob sharpening. The use of unground hobs has reduced tool cost considerably. Cutting time is 5 minutes per end, the length of cut being 1⅛".

The form on the hob is a 48° 44′ pressure angle serration with a full radius at the top of the tooth. The hob is non-topping. Climb hobbing allows the hob tooth to start its cut in metal which has had no opportunity to be work hardened.

COMBINED ENGINEERING OF HOBS, TOOLING AND MACHINES PRODUCES BENEFITS



Results obtained on this hobbing job show the benefits possible when hobs, machines and tooling are combined through proper engineering to meet the specific problems of the job.

New No. 16-16 Hobbing Machines are used, equipped with 30" rear overhanging center bracket. Bars are loaded from the rear of the spindle, where the operator easily pushes them from a conveyor into the spindle. A special steadyrest bracket guides the bar and protects the hob while loading. Work change time is 1½ minutes.

You, too, can simplify your hobbing problems by consulting Barber-Colman engineers. Why not contact them today for an evaluation of your hobbing methods.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 612 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911

NEW
TAFT-PEIRCE *Superpower*
PERMANENT
MAGNET CHUCK

PROVIDES GREATER WORKING SURFACE

An entirely new design, the Taft-Peirce Superpower Permanent Magnet Chuck has 15 to 20% less height than other makes. Provides more clearance between wheel and chuck.

Stronger, yet flexible, too. Just push or pull lever to vary power anywhere from maximum to minimum. Permanently magnetized, power won't fade with use.

Available in range of sizes. Write for bulletin, today.

Additional poles provide greater working surface.

Ideal for surface grinders, these T-P Chucks are also effective on light millers, planers, shapers. The portable smaller sizes speed hand-finishing, burring, scraping, polishing, inspection operations.

T P *T-P means Top Precision*

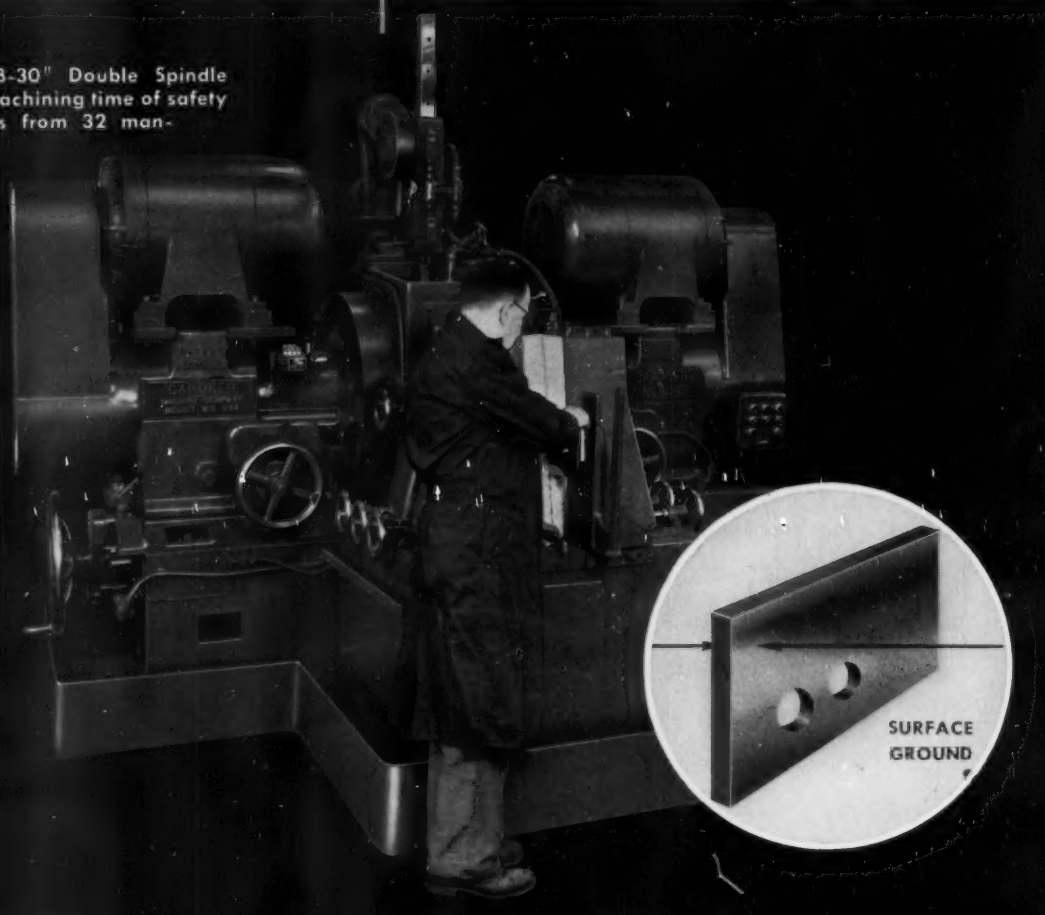
THE TAFT-PEIRCE MANUFACTURING COMPANY • WOONSOCKET, RHODE ISLAND

GARDNER GRINDING
Replaces Combined Milling-Surface Grinding

CUTS COST 75%!

TWO Surfaces Ground in **ONE** Operation

This Gardner 84B-30" Double Spindle Grinder reduced machining time of safety deposit box doors from 32 man-hours to 8 man-hours for daily production requirements.



117M

JOB DATA

MACHINE: Gardner 84B-30" Double Spindle Grinder.

PRODUCTION AVERAGE: 4 to 6 pieces per minute per cut for doors up to 6" x 10"; maximum work size, 12" x 12".

TOLERANCE: .001" to .002" for parallelism. .005" for uniformity.

For help with your flat surfacing problems, send us your blueprints for production estimates and tooling suggestions.

GARDNER MACHINE COMPANY
410 Gardner St., Beloit, Wisconsin, U.S.A.

GARDNER
precision disc **Grinders**

with NEW Fosdick BF Spindle

change boring tools repeat hole size

No more "cut and try" resetting of boring tools every time you change them! With the new BF Spindle you can change tools in seconds with such accuracy that hole sizes are repeated within ± .0001", *without* resetting. Slash time drastically, whether boring a "one-shot" jig with many different size holes or producing work where repetitive precision is essential.

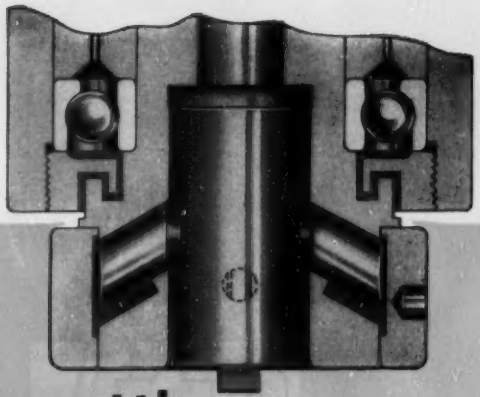
Fast tool changing with Automatic Positioning for High-Speed, Precision Boring to a NEW Degree never before obtainable.

Drop duplicating bars in place—position work for first hole and bore. Then...

PRESS the button—and in the twinkling of an eye—you're positioned within ± .0001" for the next operation.

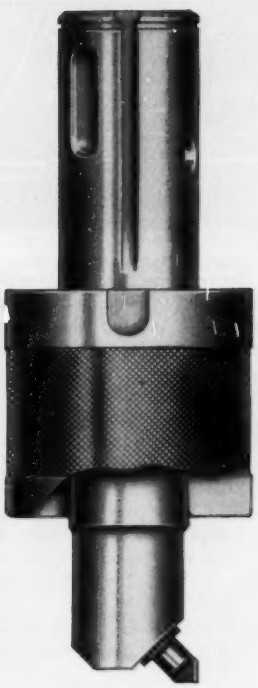
Fosdick builds Automatic Positioning into its Jig Borers to give you ± .0001" table positioning *in seconds* simply by pressing a button—even with inexperienced operators. Only two easily-made, easily-stored duplicating bars are needed for each job. Once bars are set, work initially positioned, press button and, in seconds, you're ready for the next operation! This is Fosdick's precision combination—*One hole or a thousand, same size or different, you'll hold both position and hole size to ± .0001"!*

For more information write for these bulletins: Fosdick Jig Borer.....Bulletin 42A Automatic Positioning .....Bulletin 42PA BF Spindle...Bulletin BFA



in seconds... to ±.0001" without resetting

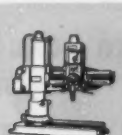
High-precision tool holder is built integral with Jig Borer spindle. Straight-shank tool adapters fit holder precisely – wipe surface clean as tool is inserted, keep dust and dirt from upsetting precision fit. Both adapters and tools "keyed-in" for identical repositioned accuracy.



With the BF Spindle, you can change boring tools while the machine positions. Simply loosen cam ring with spanner wrench. Further hand rotation releases tool.

Then insert new tool, tighten cam ring and you have Fosdick's precision combination—tool changing and work positioning both to ± .0001" in a matter of seconds!

Need Drilling Equipment? Get a Proposal from Fosdick!



Radial Drills

Jig Borers

Sensitive and Upright Drills

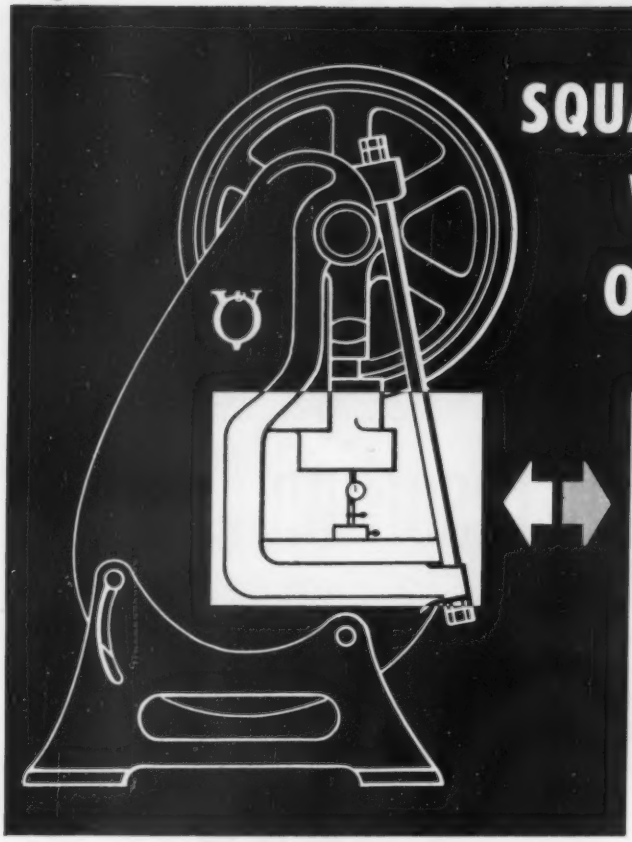
Sensitive Radial Drills

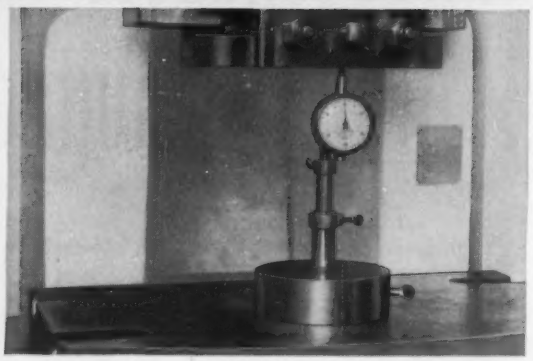
Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

SQUARE AND PARALLEL WITHIN .0005" ON A 4" STROKE





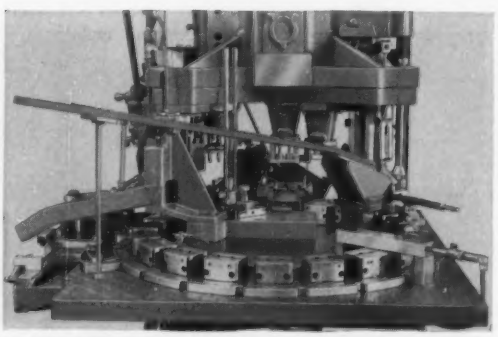
The dial indicator gage may not show a variance greater than .0005" when measuring any opposed points on these two surfaces. The same indicator is used with a ground steel square to check slide travel both F-B and R-L.

That sounds like a machine tool specification, doesn't it? Actually, it is a standard specification for a V & O long slide press: the press that is built like a high grade machine tool. We make special presses to even closer specs.

Operating precision of that order is very important if you want to use carbide dies, or fabricate thin materials, or do deep drawing, or work to high precision. You can do more, and do it better, when your press is highly accurate.

From our viewpoint, since we are going to use long slides we might as well build the rest of the press with accuracy to match. Otherwise, the precision of the long slide would be wasted. So we make extremely accurate ways and use them as reference surfaces with which all the tool carrying parts of the press must line up. And that gives you a press that will do a lot more for you.

Our representative would like to tell you more about the press that is built like a high grade machine tool. Write us, please.



Without high precision relationships between the tool-bearing surfaces and the slide travel of the press the maintenance costs of tooling of this complexity would be prohibitive.

Only the best is good enough

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

65th Anniversary

★ *STOP AND SAY HELLO AT ASTE SHOW-BOOTH 1056*

WHY THE V&O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

FOUND: A FAR BETTER SURFACE FINISH FOR VITAL TRANSMISSION PARTS

Superfinish Does the Job in One High-Speed, Automatic Operation

The demand for automatic transmissions in today's automobiles poses new problems in the machining and surface finishing of vital parts. Take this sun gear shaft: four separate bearing surfaces require ultra-fine finish to assure maximum life.

Superfinish proved to be the solution. A standard Model 51-A Superfinisher was modified for the job. Four quills, each with its own stoneholder and stones, were added along with a special workholder and driver.

MEETS ALL 3 REQUIREMENTS

Accuracy: All four surfaces are done at once—Superfinished down to 5 micro-inches from a 15 micro-inch grind. With the automatic cycle, there is precisely the same stock removal and surface finish time after time.

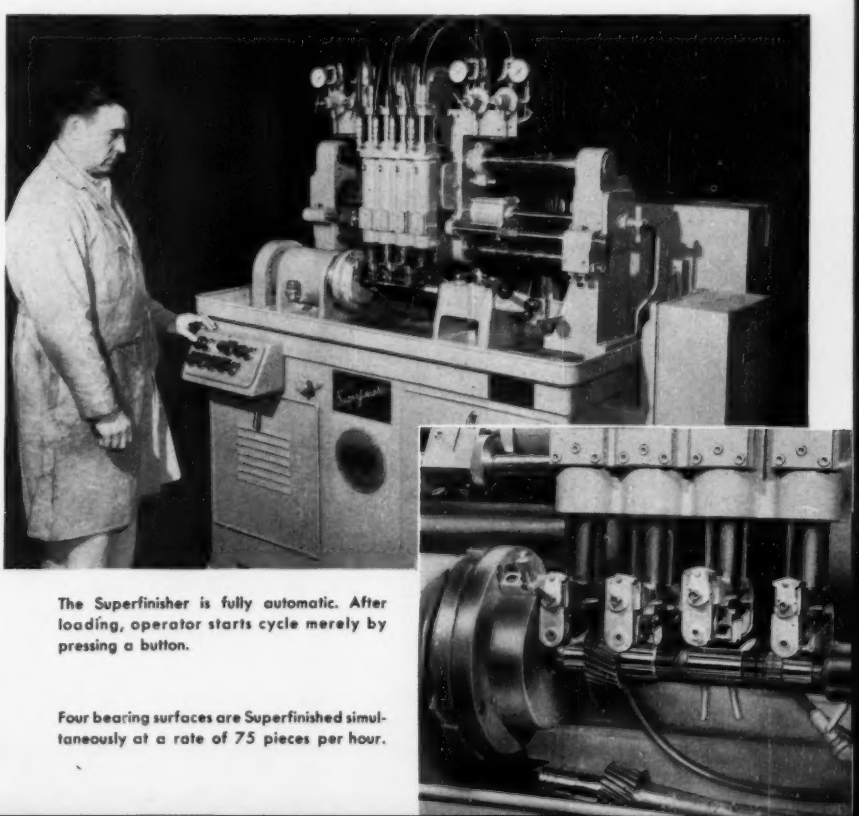
FACTS ON TWENTY JOBS—with photos and complete information are given in this brand-new Superfinish Catalog, just printed. The many typical applications will show how Superfinish can help you—in achieving better quality surface at low costs. Write for your copy today.

Superfinish rids the bearing surfaces of all annealed "smear metal" and grinding flats. Surfaces are true base metal, assuring absolute maximum bearing life.

High-Speed Output: The single Superfinisher produces 75 completed shafts per hour at 85% efficiency.

Low Costs: With the low machine investment and the fast automatic operation of the Superfinisher, production costs are very low. Because Superfinishing takes the place of a final grinding operation, costs are actually lower—yet surface finish is far better and longer lasting.

Here, with both low machine investment and low production costs, vital transmission parts get far better, smoother, longer lasting surfaces.



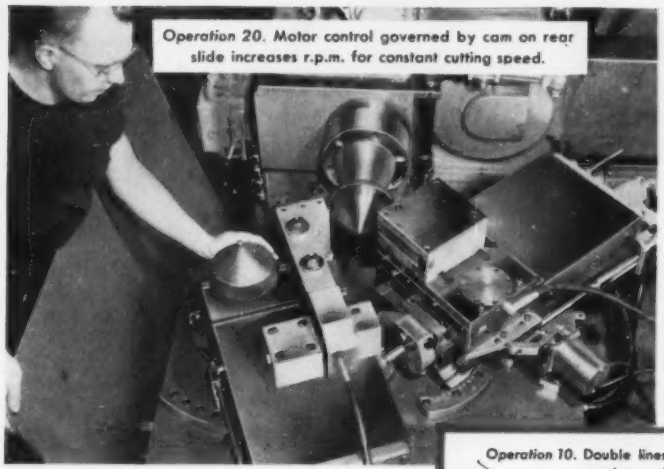
The Superfinisher is fully automatic. After loading, operator starts cycle merely by pressing a button.

Four bearing surfaces are Superfinished simultaneously at a rate of 75 pieces per hour.

GISHOLT

TIME-SAVING IDEAS

WORKING ALL ANGLES TO CUT COSTS ON DRILL BIT BLANKS



Operation 20. Motor control governed by cam on rear slide increases r.p.m. for constant cutting speed.

No. 12 Hydraulic Lathes Adjust Quickly for Many Different Parts and Angles

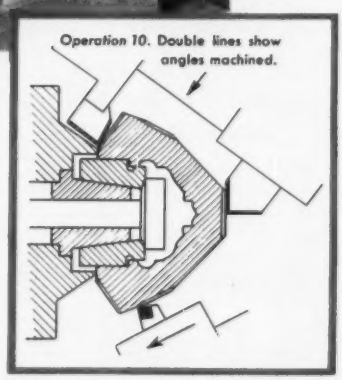
The question to be answered by this producer was how to most efficiently machine similar parts having dissimilar angles . . . and get easy changeover to other sizes. The workpieces are hard steel cone blanks; the finished products are oil well drill bits.

Because of the variety of sizes involved with each type having multiple angles, the practical solution was a pair of No. 12 Hydraulic Automatic Lathes. These are operated by one man. Changeover is simple with tool slides mounted on swivel bases.

A typical setup for operation 10 is shown in the tooling layout. Both front and rear slides can be adjusted to the required angles. The work on this 6½" cone takes less than a minute and a half, f.t.f.

Operation 20 is shown in the photo. Again the front and rear slides are mounted on swivel bases. The rear slide turns the long cone, and a special motor control speeds up the spindle to give a nearly constant cutting speed as the tool approaches the cone point. A fine finish and excellent tool life is the result. The front slide turns in the conventional manner. Floor-to-floor time is just over a minute.

Having slides that pivot is a big time saver in changeover of the No. 12 Hydraulic Automatic Lathes to other parts with different angles.



Operation 10. Double lines show angles machined.

HOW THIS AWKWARD PART IS MACHINED WITH EASE

Note counterbalanced fixture for holding awkward part.

Unusual Job Efficiently Handled on Turret Lathe

How to handle this awkward, unbalanced part on a general-purpose turret lathe? Good planning and a 2L Saddle Type Turret Lathe provided the solution.

A special angle plate fixture with locating feet was built to hold the long rotor shaft housing. This eliminates chucking strain and insures that both bores will be round, concentric and in line. The counterweighted fixture is dynamically balanced with the workpiece to permit the high spindle speeds required for volume output and proper finish.

Tools are simple. Vertical slide tools handle all recessing, and boring bars take care of the two diameters. Time is 8.6 minutes floor-to-floor. Changeover for other size housings is simple.

★ ★ ★ ★ ★ ★ ★ ★

Doing boring and recessing on this clumsy part is a simple operation on the saddle type lathe with special holding fixture.

GISHOLT

TIME-SAVING IDEAS

GETTING A FIRM GRIP ON FRAGILE PART

Fastermatic Sets Fast Pace on Light Frame

Rough piece (left) and finished parts.

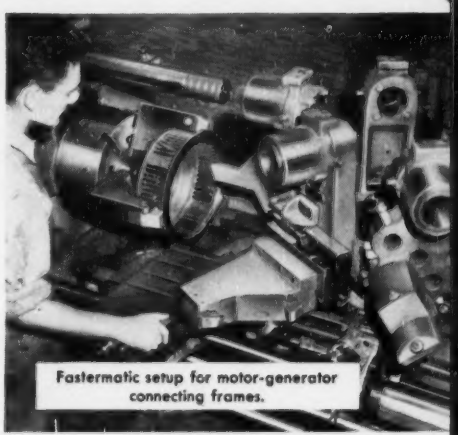
Thin-wall parts are usually a problem. But, in this case, the job is doubly tough because the workpiece is a welded assembly and has an open frame. Bores must be concentric and the faces parallel.

Devising a holding fixture was a routine matter, with Gisholt's long experience as a builder of lathes and chucks providing a "stock answer." A standard 15" 3-jaw air chuck assures speedy operation and controlled chucking pressure. Extended jaws permit pressure to be applied by rocker-type jaw ends on the front and back rings. This centers the workpiece and equalizes pressure at all points, avoiding distortion.

A 2F Fastermatic Automatic Turret Lathe handles the job. To avoid possible distortion from excessive stock removal, rough and finish cuts are made on both bores and faces. Special long tool holders carry tool bits for simultaneously machining the front and back surfaces.

The job is completed in the excellent time of only 5.5 minutes—with the automatic cycle of the Fastermatic enabling the operator to run other machines.

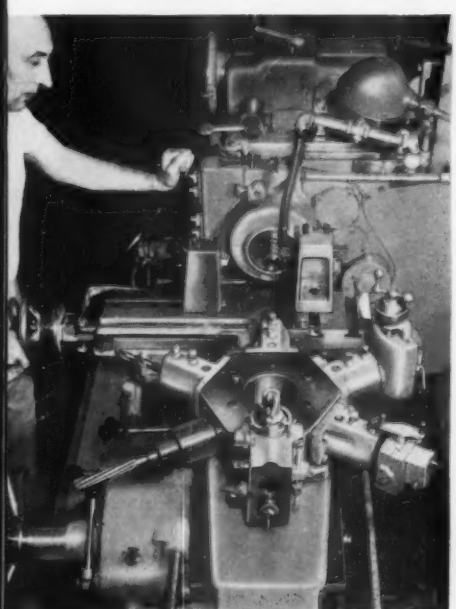
Fragile parts are quickly produced with repetitive accuracy, thanks to well-planned chucking and the automatic cycle of the Fastermatic.



Fastermatic setup for motor-generator connecting frames.

BUSINESS-LIKE SETUP FOR MACHINING BUSHINGS ON TURRET LATHE

Ram Type Machine Has Standard Hydraulically Actuated Collet Chuck and Bar Feed



Setup for efficient machining of stainless steel bushings.

Here's a fast, simple, low-cost way for machining 1¾" ring seal bushings. The job is done in a single operation on a No. 4 Ram Type Turret Lathe.

To start, the stainless steel bar stock is advanced through the spindle and held in the collet chuck. Both movement and clamping are hydraulically actuated—saving both time and effort.

The first station on the hexagon turret is a stock stop. The next two stations are used for conventional drilling and reaming. A vertical slide tool, seen in the foreground of the photo, carries a hook cutter and catches the first recess in the bore. The turning of the straight OD from the cross slide is then combined with the five-degree chamfer from the hexagon turret. The second recess in the bore is formed from the sixth station. Cut-off tool at rear of cross slide completes the operation.

Well-planned tooling with the advance and clamping of bar stock hydraulically controlled saves time and effort on this Ram Type Turret Lathe job.

GISHOLT

TIME-SAVING IDEAS

MASSIVE FLYWHEELS BALANCED FOR SMOOTH OPERATION

Direct Readings Show Unbalance Correction Required

The huge part you see here is a non-magnetic inertia flywheel for Navy Minesweepers. The problem is to make them smooth and quiet in operation. This means precision balancing which is readily done on a Gisholt DYNETRIC Floor Type Balancing Machine.

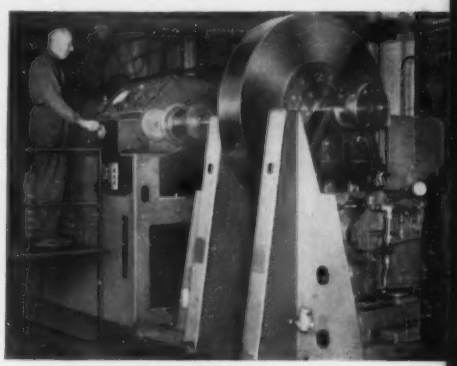
The flywheel assemblies weigh 5,200 lb. and measure 50" in diameter. Although the dynamic correction planes are only 9½" apart, the flywheels are easily balanced to less than 1 ounce inch in each plane. Correction for unbalance is made by grinding on the outer rim.

The flywheel is balanced on its own shafts and supported on its own bearings. Heavy oil pressure to the half bearings eliminates metal to metal contact and protects the arbor journals. Other rotating parts of the engines are also balanced to fine tolerances, assuring quiet, smooth operation of the final assembly.

Whether your problem is balancing large parts like these . . . or components weighing only ounces, there is the right Gisholt Balancer for the job.

"Floating" these heavy parts on pressurized half bearings not only protects the bearing journals, but facilitates precision balancing as well.

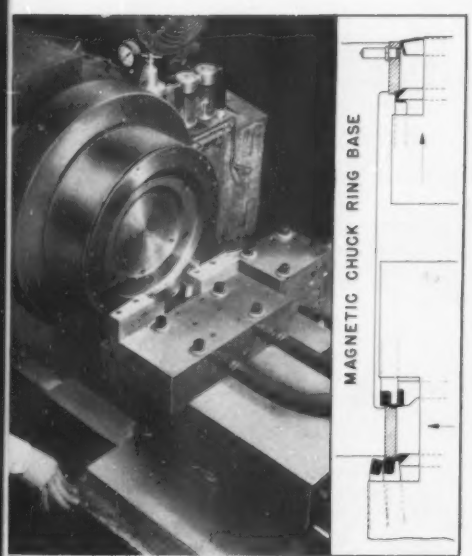
DYNETRIC BALANCERS



PRODUCTION BALANCING . . .

is only one of the many helpful subjects covered in the Gisholt Balancing School —only service of its kind available to industry. Ask for details.

HOW TO HOLD CRITICAL DIAMETERS ON LARGE, THIN PARTS



Tooling setup on two slides.

Standard Simplimatic with Special Chucking is the Answer

The workpiece is a flywheel cover plate. It's a difficult part, both to hold and machine.

Here's how the job is done:

Because of the thin-wall and wide diameter of the workpiece, a magnetic chuck with a ring base and locating pins is used. With the slightly smaller size of the base, the turning and boring tools have clearance to pass through the work.

For concentricity of the OD and ID, they are machined simultaneously —rough, finish and chamfer the OD; bore and counterbore the ID. Five tools mounted in a single tool block on the front slide handle this work while three tools on the rear slide move across to face, chamfer and groove the ID.

Time is an even 3 minutes floor-to-floor, showing the efficient setups you can have with the Simplimatic Automatic Lathe.

Smart chucking and simultaneous machining of the ID and OD aid greatly in achieving speed and accuracy on these delicate parts.

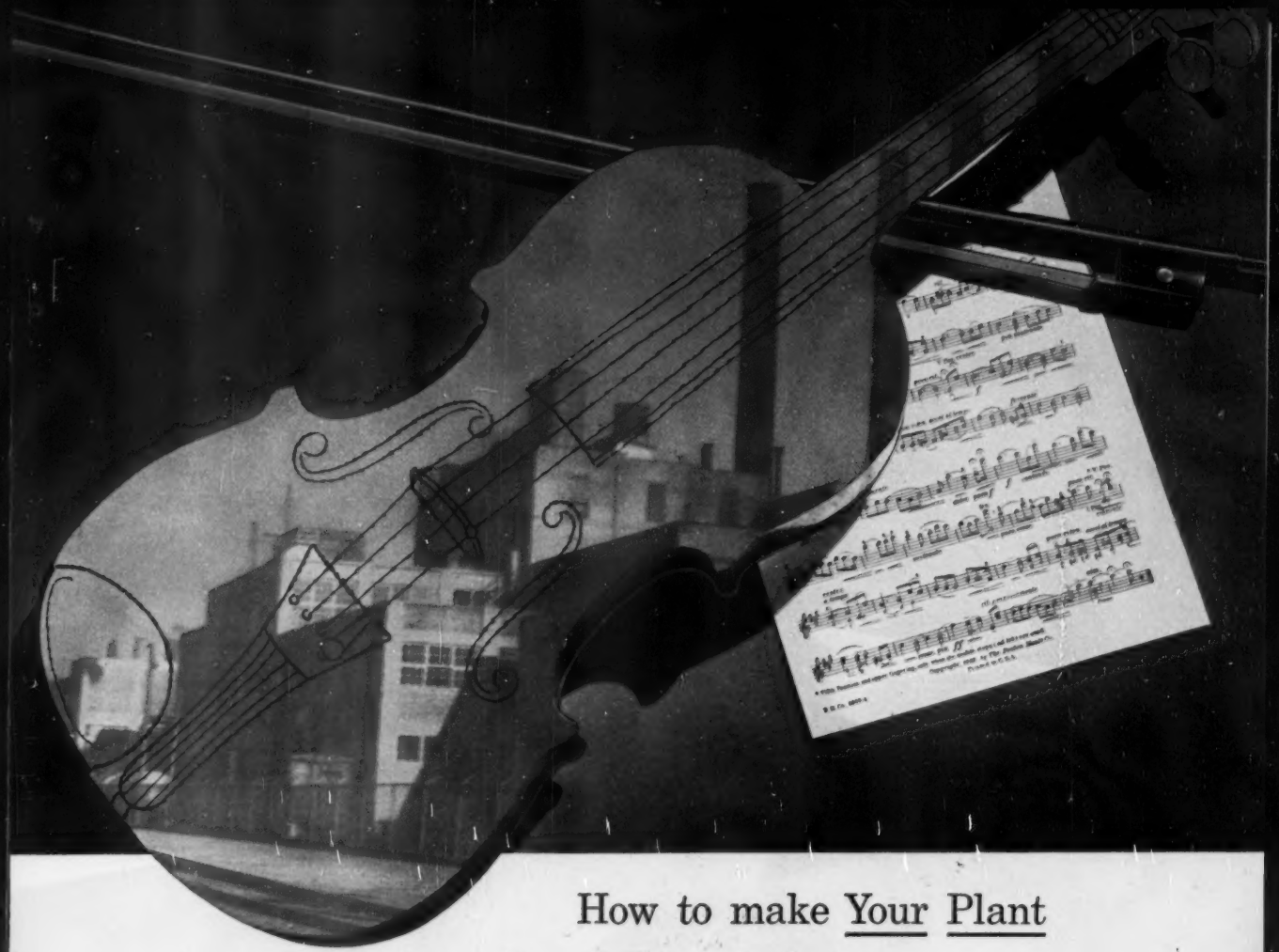
Many interesting jobs and tooling illustrations are shown in the helpful Simplimatic catalog. Ask for Bulletin 1159.

No. 1-254
615

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



How to make Your Plant fit as a fiddle!

SWITCH TO CIMCOOL°, and listen to the sweet music of your machines as they run faster, smoother than ever. Then listen to the happy melody of your adding machines totaling the money saved. For this revolutionary cutting fluid—this *chemical emulsion*—lowers costs three important ways:

CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its *chemical lubricity*.

FASTER SPEEDS are possible because Cimcool *cools faster*, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

CIMCOOL COSTS LESS than old-fashioned cutting fluids because it *lasts longer*. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And, because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

For a demonstration of how to make your machines *sing—for a song*—just write us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

CIMCOOL

for 85% of all metal cutting jobs

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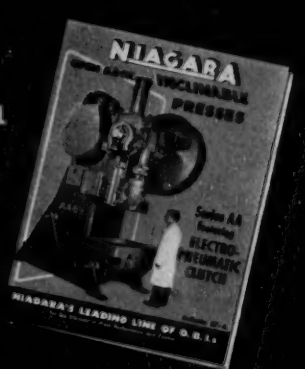
- Operates effortlessly by palm buttons or foot switch.
- Stops automatically if power or air pressure fails — an important safety feature.

Never before in O. B. I. Press history, has there been so significant a development as this new Niagara line . . . Series AA. Built in eight sizes, with shaft diameters from 3 to 7½ inches, it has set a new high for performance and stamina in blanking, forming, drawing, perforating, combination die and automatic feeding operations.

Get the complete story. Send for literature. Talk with our representative. SEE the press in action. Compare! Then, decide.

AND YOU'LL FIND ALL THE FACTS IN HERE!

BULLETIN 57-A
Sent free...promptly!



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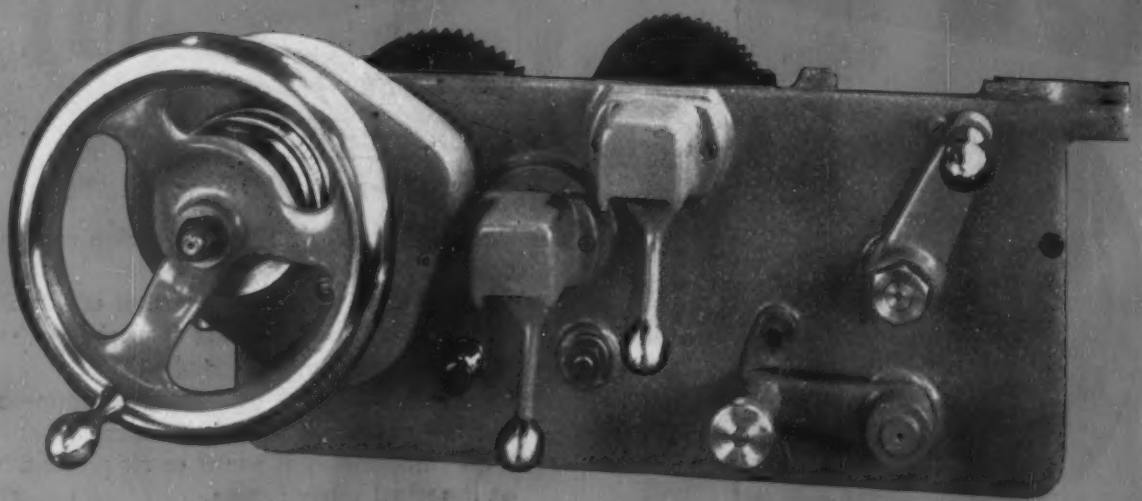

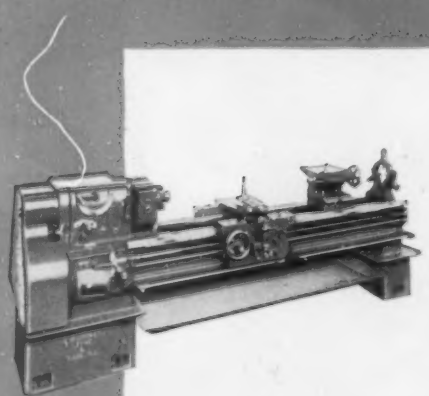

1. All-geared headstock
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5. Tapered key drive spindle nose
6. Multiple-disc clutch and brake
7. 32 thread and feed changes
8. Forged steel spindle and all headstock shafts mounted in precision antifriction bearings

For complete catalogs, prices and name of your local dealer, write on company letterhead to Cincinnati Lathe & Tool Co., 3242 Disney, Cincinnati 9, Ohio.

A Quality Lathe Apron

A glance tells you it's built for convenience and safety. There are two spindle start-stop levers, one located on the apron, for ease of operation. The chasing dial is built in. The independent drop levers for cross and longitudinal feed, lift to engage. This disengages feed if an object falls on them. For extra convenience, the oil shot plunger is also located on the apron.

is Standard on 16" Cincinnati LT Lathes costing only $4829*

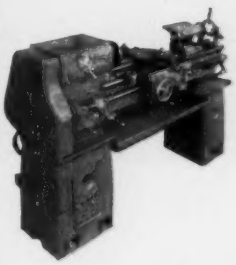
The wide range of work these lathes will handle, plus their low initial and maintenance costs, assures a fast return on your investment. They are the only low-priced lathes in their class with high-priced features:

*16" x 30" including motor and controls F. O. B. factory. Prices subject to change without notice. Direct reading length dial shown is available at extra cost.

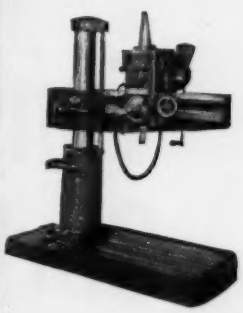
center on . . .

cincinnati lathes and drills

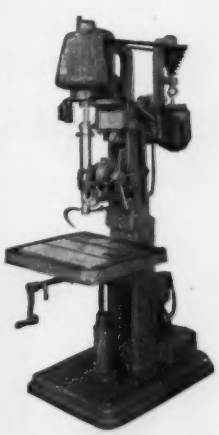
There is also a complete line of Tray-Top Lathes and Cincinnati Floor, Bench and Radial Drills



Light-duty Tray-Top Lathes (10" to 18" swing)



Radial drills (3' arm, 7" column)



Drilling machines, floor and bench (sizes 16", 18" and 21"; illustrated, 21" slider)

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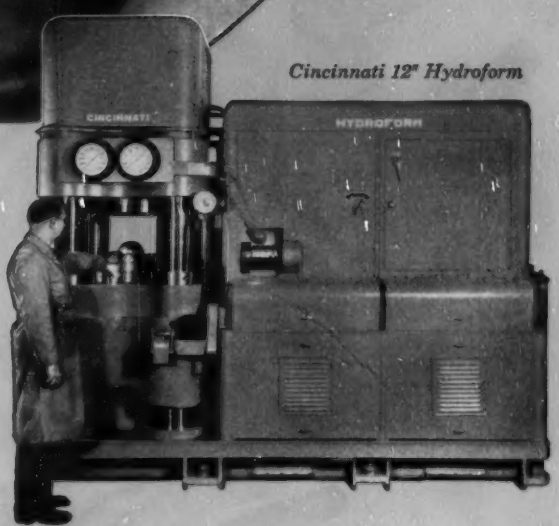

Cincinnati 12" Hydroform

...another job made to order by Hydroforming

By producing the tail light bezel shown above on a Cincinnati 12" Hydroform, a major automobile manufacturer was able to complete development work and run off the 60 pieces required for model approval at a saving of *six to eight week's time*—and at an 85% *reduction* in tool costs!

Making conventional dies and incorporating subsequent design changes which resulted during the development of this complex part would have made tool costs excessively high. As the Hydroform tools consisted simply of a punch of steel bar stock, and a draw ring contoured to fit around the punch, original tool costs were low and modifications were readily made at minimum cost.

Additional savings resulted as Hydroforming did not impair the excellent finish of the material—.031" brass. After trimming, only light buffing was required for plating.

This is another example of the tool and time savings that Hydroforming makes possible . . . for development work . . . for short runs . . . for the production of any simple or complex deep drawn or formed part. Consult your nearest Cincinnati Milling field engineer for complete details on Hydroforming. For a description of the Hydroforming process and specifications of the 8", 12", 19", 23", 26" and 32" machine sizes, write for Bulletin M-1759-2.

CINCINNATI **Hydroform**

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Tools so vitally situated, no matter how trouble-free, deserve periodic checking . . . checking to see that the correct size and correct type ARMSTRONG TOOL HOLDER is being used for each operation: checking to be sure that you are taking full advantage of the newer additions to the Armstrong System—the special types for ARMIDE (Carbide Tipped) Cutters, others for ARMOLOY (Cast Alloy) Bits and Blades; the newer "spring" form threading tools and cutting-off, etc., etc.

Write for a recent ARMSTRONG Catalog and check your tooling of each operation.

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The New Intrimik Internal Tri-Point Micrometer reduces measurement of bores and holes to a simple "miking" operation . . . saves you the cost of expensive plugs and setting rings. Made in 20 sizes, these handy micrometers measure bores from 0.275" to 8.000" . . . give readings *directly* in increments of 0.0001", 0.0002", or 0.0005" depending on size. Provide positive accuracy possible only through three-point bearing design. Write for complete illustrated Bulletin describing the new Intrimik.

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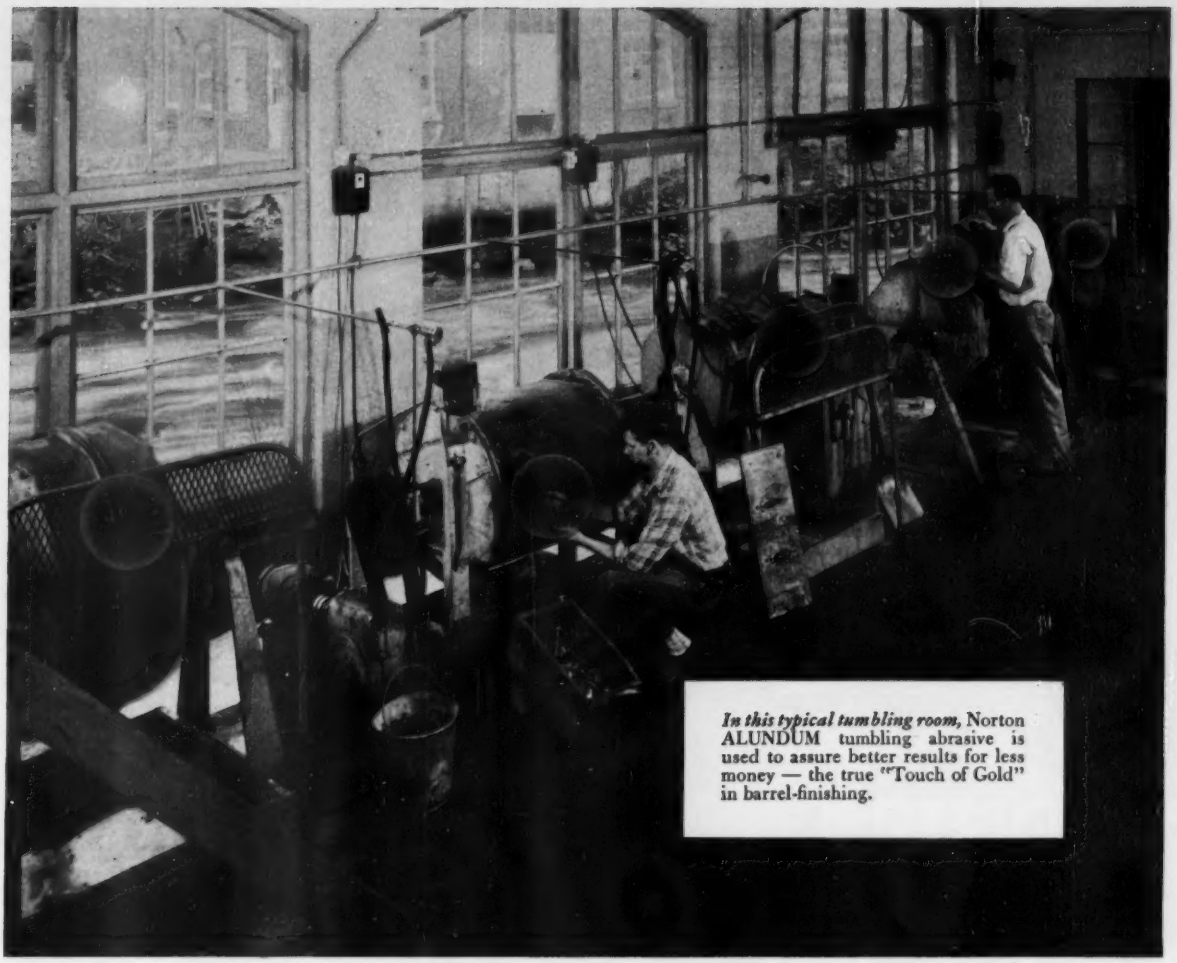

In this typical tumbling room, Norton ALUNDUM tumbling abrasive is used to assure better results for less money — the true "Touch of Gold" in barrel-finishing.

Start with ALUNDUM* tumbling abrasive . . . and you'll finish with the

"TOUCH OF GOLD"

Especially developed to eliminate hand finishing of stampings, forgings and castings, Norton ALUNDUM tumbling abrasive is processed to impart a strong, blocky shape to the individual grains, with no sharp projections to mar the work. Here are some of the reasons why barrel-finishing with this tough, hard abrasive is standard in leading plants:

- It provides the fastest, most economical method of finishing metal parts to exact dimensions and surface finishes.
- It removes burrs, flash, tool marks and heat scale from large quantities of parts, saving endless man-hours.
- It eliminates many slow hand-finishing operations, increases production rate of parts ranging in size from tiny needles to hefty castings.

Learn how ALUNDUM tumbling abrasive can bring *you* the value-adding, cost-cutting "Touch of Gold" — by giving you constantly better finishing results while helping you shorten tumbling cycles, reduce scrap and reworking. Whether or not you have barrel-finishing, Norton will gladly make test runs for you, to show you what this process with ALUNDUM tumbling abrasive will do for you.

See your Norton Distributor, and ask him for the new edition of the 55-page booklet on barrel-finishing. Or write to NORTON COMPANY, Worcester 6, Mass.

Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

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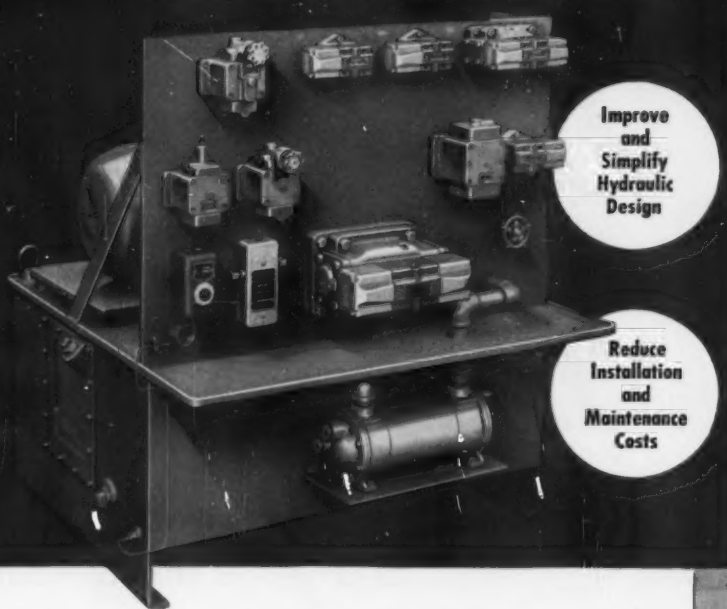

Improve and Simplify Hydraulic Design

Reduce Installation and Maintenance Costs

A Vickers Custom Built Power Unit is much more than a collection of parts . . . just as the machines you build are more than the castings, shafting, gears, motors, etc. that go into them.

The Vickers Unit is designed and built with the "know-how" obtained during more than a quarter century of experience in practically every kind of hydraulic operation, plus a thorough understanding of your needs. It is built exactly to your individual requirements. All necessary pumps, valves, intermediate piping, oil reservoir, motors, controls, etc., are in one compact and self-contained "package". It includes all needed hydraulic accessories such as oil filters, air cleaners, oil level gauges, fittings, etc. Hydraulic connections may be grouped in a conveniently located manifold.

The result is simplification of hydraulic design and important savings in installation and maintenance costs. Vickers undivided responsibility for the entire hydraulic control system is another important advantage to both the machine builder and his customer. • Write for new Bulletin 52-45.

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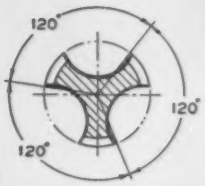
THE STANDARD LINE: *Twist Drills - Reamers - Taps - Dies - Milling Cutters - End Mills - Hobs - Counterbores - Special Tools*

PAINSTAKING PROCESSING THAT PAYS OFF —

BALANCED Action

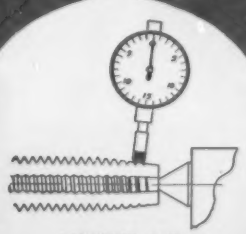
The manufacturing process that builds Winter BALANCED ACTION Taps didn't "just happen." It *resulted*—from a half-century of designing and manufacturing taps to give the most in *accuracy* and *maximum tool life*. . . . All Winter taps—and *only* Winter Taps—have BALANCED ACTION.



EXACT FLUTE SPACING

UNIFORMITY OF FLUTE CONTOURS

PRECISION CHIP DRIVER CONTOURS



ACCURATE AND CONCENTRIC CHAMFERS

ALWAYS AT YOUR SERVICE

Your local Industrial Supply Distributor carries a complete stock of WINTER Taps.

WINTER

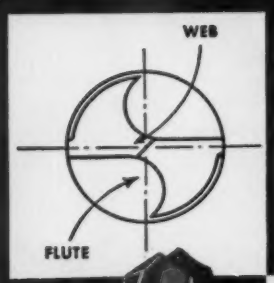
WINTER BROTHERS COMPANY

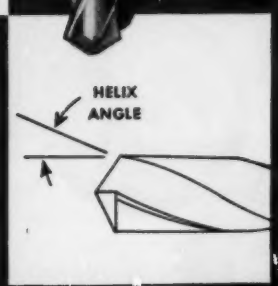
Rochester, Michigan, U. S. A. Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Co.

NATIONAL TWIST DRILL & TOOL
ROCHESTER, MICH., U.S.A.

National

NATIONAL GIVES YOU THE EDGE





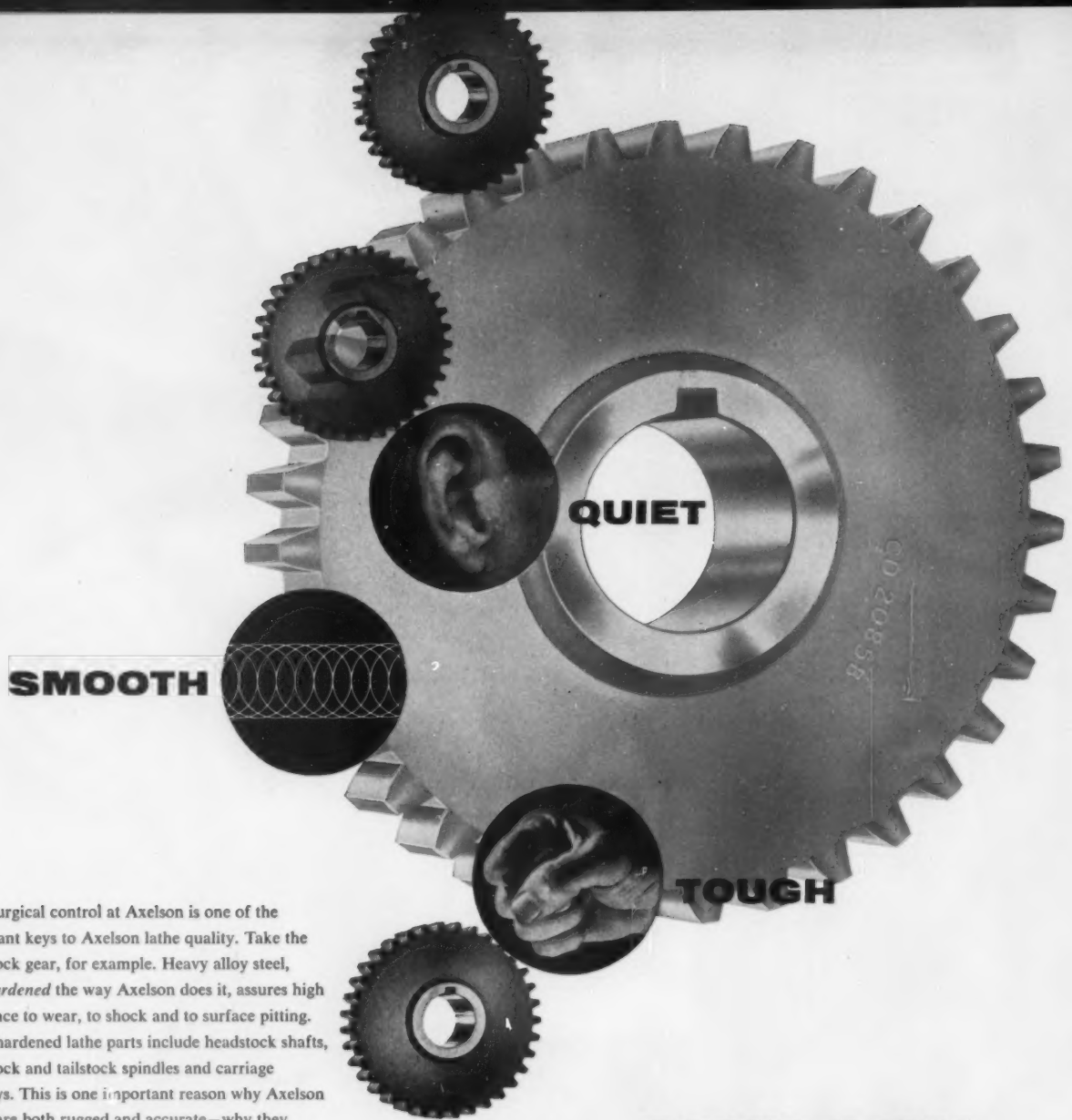
CALL YOUR
INDUSTRIAL SUPPLY
DISTRIBUTOR

. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and Special Tools.

The Design's the Thing!

National Twist Drills are precisely designed for maximum performance:
THE WEB: Thin enough for easy penetration. THE FLUTES: adequate for free flow of coolant and chips. THE HELIX ANGLE: just right for correct rake angle and easy chip delivery. THE CUTTING EDGES: famed for long life.

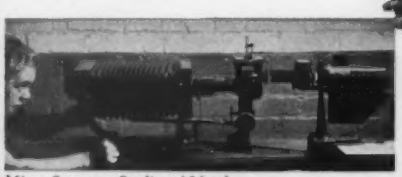
NATIONAL TWIST DRILL AND TOOL COMPANY
Rochester, Michigan, U. S. A. Distributors in principal cities.
Factory Branches: New York • Detroit • Chicago • Dallas • San Francisco



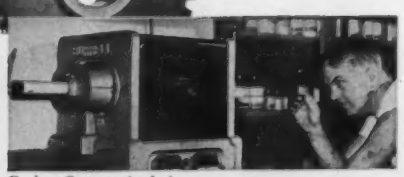
Metallurgical control at Axelson is one of the important keys to Axelson lathe quality. Take the headstock gear, for example. Heavy alloy steel, *case-hardened* the way Axelson does it, assures high resistance to wear, to shock and to surface pitting. Other hardened lathe parts include headstock shafts, headstock and tailstock spindles and carriage bedways. This is one important reason why Axelson lathes are both rugged and accurate—why they maintain their precision for long periods even under the heaviest work load. Axelson is the master of meticulous detail. Below, a few of the check points in the Metallurgy Department.

AXELSON LATHES

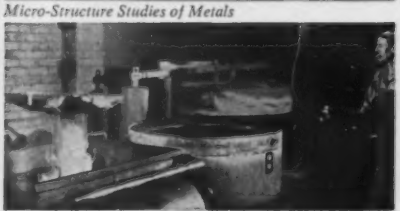
Hardness Testing



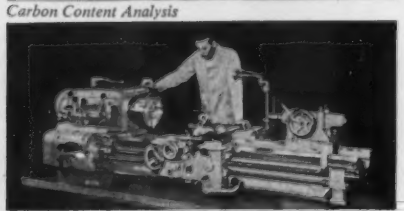
Micro-Structure Studies of Metals



Carbon Content Analysis



Case Hardening



16" Precision Tool Room Lathe

AXELSON
MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.
LOS ANGELES 58, ST. LOUIS 16, NEW YORK 7, TULSA 1

RAILROAD FREIGHT CARS • STANDARD PARTS
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LATHES: ENGINE • TOOL ROOM • HOLLOW SPINDLE
GAP BED • PETROLEUM PUMPING EQUIPMENT:
DEEP WELL PLUNGER PUMPS • SUCKER RODS • HY-
DRAULIC PUMPING UNITS • AIRCRAFT COMPONENTS
L-48

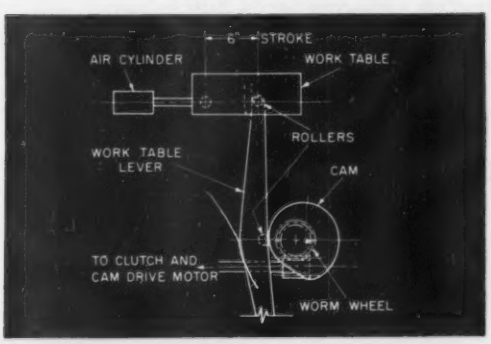
THE BRYANT 6" STROKE *all Mechanical* BORING MACHINE

gives you

uniform accurate production

in precision boring, drilling, turning, facing, grooving and contour boring and turning

Higher Production Rates — The Bryant 998 is designed specifically to give rapid production with constant repetitive accuracy. The table is actuated by a simple cam and lever unit which provides positive control of the cycle at all times. This mechanical actuation of the table eliminates variation in the cycle due to temperature change. An air cylinder exerting uniform pressure directly on the table keeps the cam follower roll in steady contact with the cam, thus preventing backlash and jump. Cycle may be semi-automatic or automatic.



Finer Finishes — The Bryant 998 provides smooth, uniform table motion, an essential factor in generating a fine finish with a single point tool. The table moves on two 4" diameter solid steel slide bars firmly bolted to the bed. Each bar has two anti-friction preloaded ball bearings providing a metal-to-metal contact which eliminates slight shifting due to the presence of an oil film. The boring head spindles rotate in special super-precision ball bearings. These are spring-loaded, to ensure maintenance of spindle alignment during both boring and facing operations.

Less Down-Time — The Bryant 998 requires minimum maintenance. Motors, boring heads and slides are permanently grease sealed. This simple mechanical design is easily understood, and the units are accessible for maintenance.

Mail coupon for complete details!

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VT.

Gentlemen: Please send me your Bulletin 998. AM

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Title.....

Company.....

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City.....Zone....State.....

BRYANT Chucking Grinder Co.

SPRINGFIELD, VERMONT, U. S. A.

Internal Grinders • Boring Machines
Internal & External Thread Gages • Granite Surface Plates

CINCINNATI SHAPERS

...serve over 2,000,000 square feet of manufacturing facilities!

In this large plant of the Scovill Manufacturing Company this battery of Cincinnati Shapers economically does a wide range of precision work on many materials, including alloys of all metals from cast iron to high acid resistant tool steel.

Tools and new machinery are produced in this department, which also does maintenance work for the entire plant. The Cincinnati Electro Magnetic Clutch and Brake also contribute to speed here, where accuracy and versatile performance are necessary.

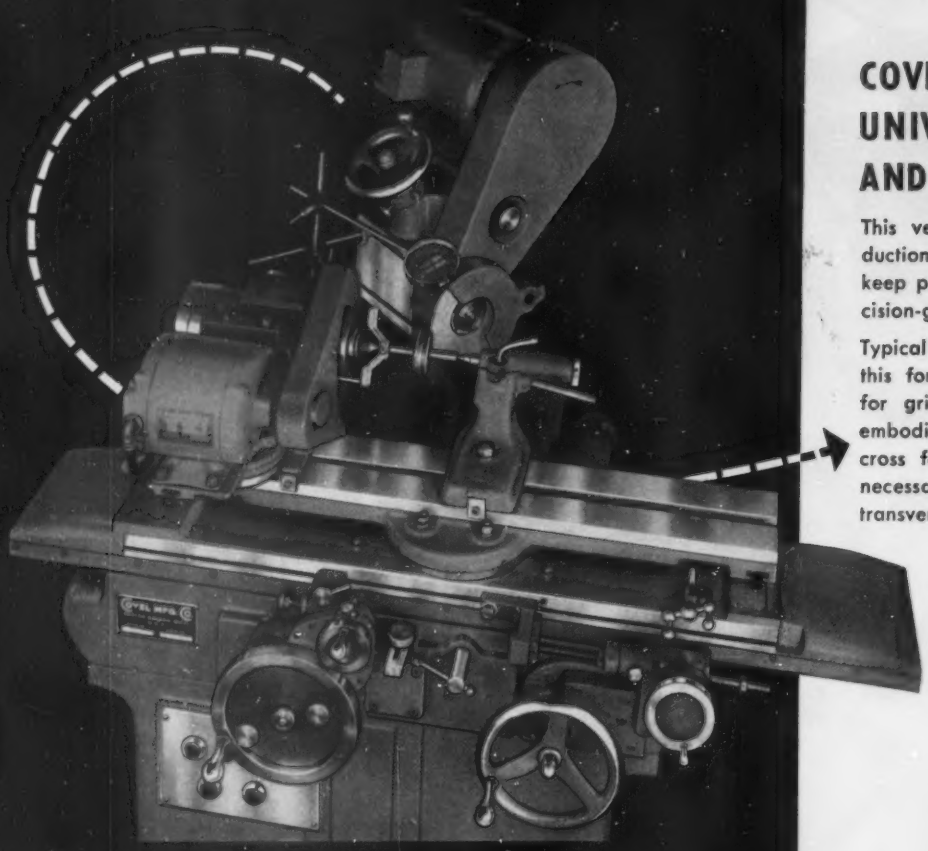
CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

Photo courtesy Scovill Manufacturing Company, Waterbury, Connecticut.

Write for New Cincinnati Shaper catalog No. 6. Comprehensive and up-to-date, covering the complete line of these modern Shapers.



COVEL NO. 12 UNIVERSAL CUTTER AND TOOL GRINDER

This versatile machine can get production off to a flying start — and keep pace with a steady flow of precision-ground, highly efficient tools.

Typical of No. 12's *universal* scope is this form grinding attachment set-up for grinding circular form tools. It embodies fine longitudinal feed—fine cross feed; for the extreme accuracy necessary for both longitudinal and transverse movement.

Write for
12-page detailed
Bulletin A44

PRODUCTION *Starts* IN THE TOOL ROOM

Look to your tool room — where production starts — and see whether your tool-makers and set-up men are hampered by obsolete, inaccurate and wasteful grinding equipment. Poorly ground tools and cutters handicap production every step of the way — through inferior results, costly rejects, loss of valuable time, expensive tool waste.

If your cutter and tool costs are high, perhaps you are *paying* for Covel quality without enjoying its many profit-saving advantages . . . and if so, now is the time to call on Covel for the answer. We will be pleased to send complete information.

80 YEARS of continuous manufacturing experience makes your COVEL choice a sound one.

COVEL PRECISION GRINDERS
BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

"WE GET BROACHING SERVICE"

by Master Mechanic

Leading Automotive Parts Maker

We have been relying on Colonial Broach Company for all phases of broaching—engineering, manufacturing, and service—for over 25 years.

Several of our Colonial 10-ton pull-ups and horizontals have been in continuous use, at times on a three shift basis, since 1936, broaching gears, splines, etc., for tractor and automotive transmissions. Today, over 80% of the broaching machines in our shop, on both internal and surface broaching operations, are Colonials.

Engineering cooperation on fixture design from Colonial is the best. We get exactly what we require for both internal and surface broaching applications, and we get it promptly.

Colonial supplies the greatest percentage of our broaches. Design, accuracy, broach life, and resharpening service are all that we could ask. In all our 25 years of dealings, Colonial has never failed us when we had to have something in a hurry

MACHINES

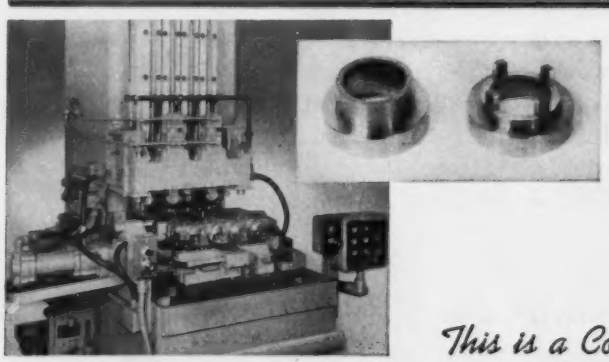
BROACHES

FIXTURES

AUTOMATION

COLONIAL BROACH CO. DETROIT 13

Unified Broaching

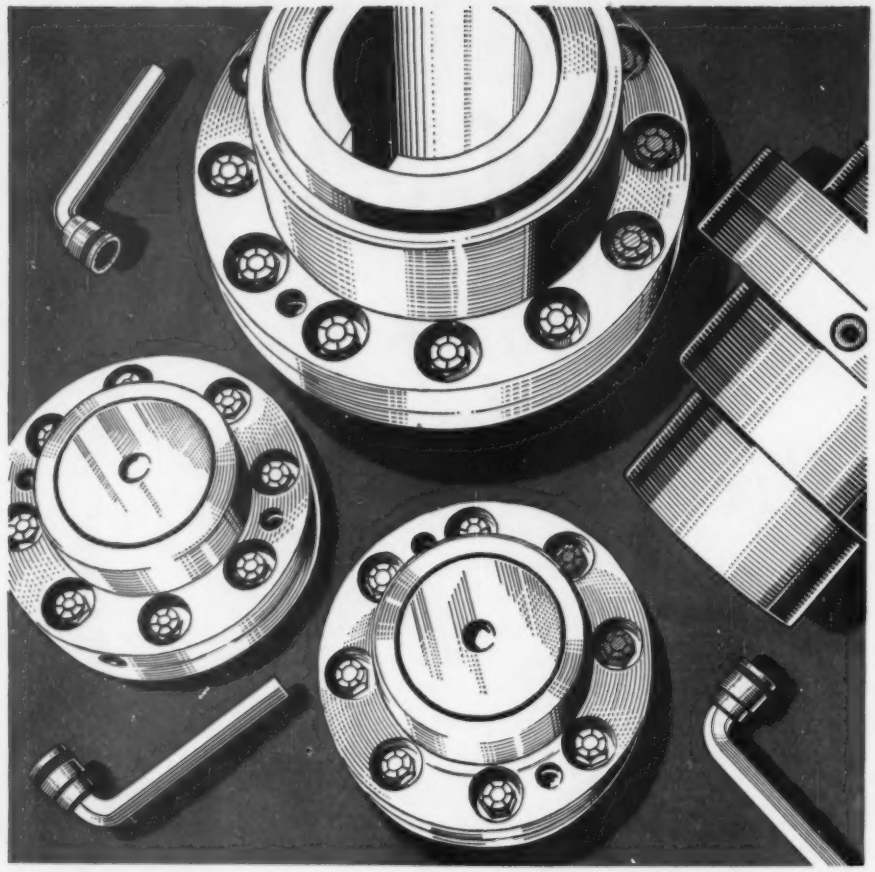


2-STEP BROACHING—280 GEARS per hr.

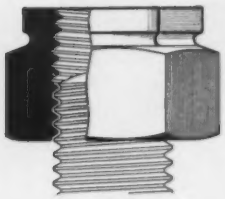
Four tangs on 280 automotive oil pump drive gears per hour are broached in two steps on a Colonial RS-10-54 single ram broaching machine. Tangs are 0.345" x 0.431".

Four parts are broached on one side of a 180° indexing shuttle fixture, while broached parts are unloaded from outside stations, semi-finished parts are moved from inner to outer stations, and blanks mounted on inner stations. Fixture recedes, indexes 180° as broach returns, then advances to broaching position, and cycle is repeated.

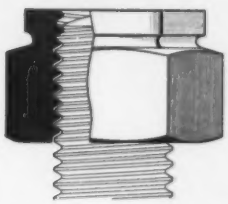
This is a Colonial Unified Broaching Installation



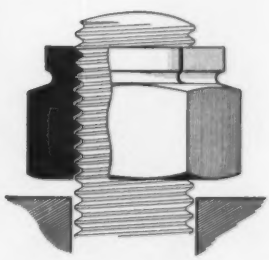
Manufacturers of couplings like these find that FLEXLOC Self-Locking Nuts provide faster assembly and safer, more dependable locking than is afforded by most other methods.



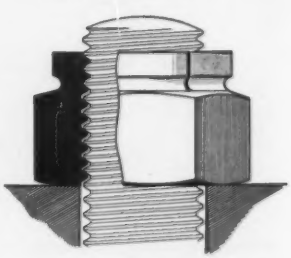
Starting. A FLEXLOC starts like any ordinary nut. Put it on with your fingers. Tighten it with a standard hand or speed wrench.



Beginning to Lock. As the bolt enters the segmented locking section, the section is expanded, and the nut starts to lock.



Fully Locked As a Stop Nut. When 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC is fully locked. A FLEXLOC does not have to seat to lock.



Fully Locked As a Seated Nut. When it is used as a lock or stop nut, the locking threads of the FLEXLOC press inward against the bolt, lifting the nut upward and causing the remaining threads to bear against the lower surface of the bolt threads. Vibration will not loosen a FLEXLOC, yet there is no galling of threads.

Here's why more and more original equipment manufacturers specify FLEXLOCs

Whether it's on power transmission couplings or on access doors of helicopters, more and more FLEXLOC Self-Locking Nuts are being used to insure positive fastening of assemblies.

There are many reasons for this. FLEXLOCs reduce production costs. They are easy to install. They are one piece, all metal—nothing to assemble, come apart, lose or forget. They eliminate complicated, time-consuming methods of locking bolts and studs. They stay put—once their locking threads are fully engaged, they won't work loose. They are easy to get—SPS can make prompt delivery of FLEXLOCs in any quantity, and in a wide range of sizes, through a national organization of industrial distributors. Write for literature and samples. STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.

FLEXLOC® LOCKNUT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

"AMERICANS" WORKING FOR NORDBERG

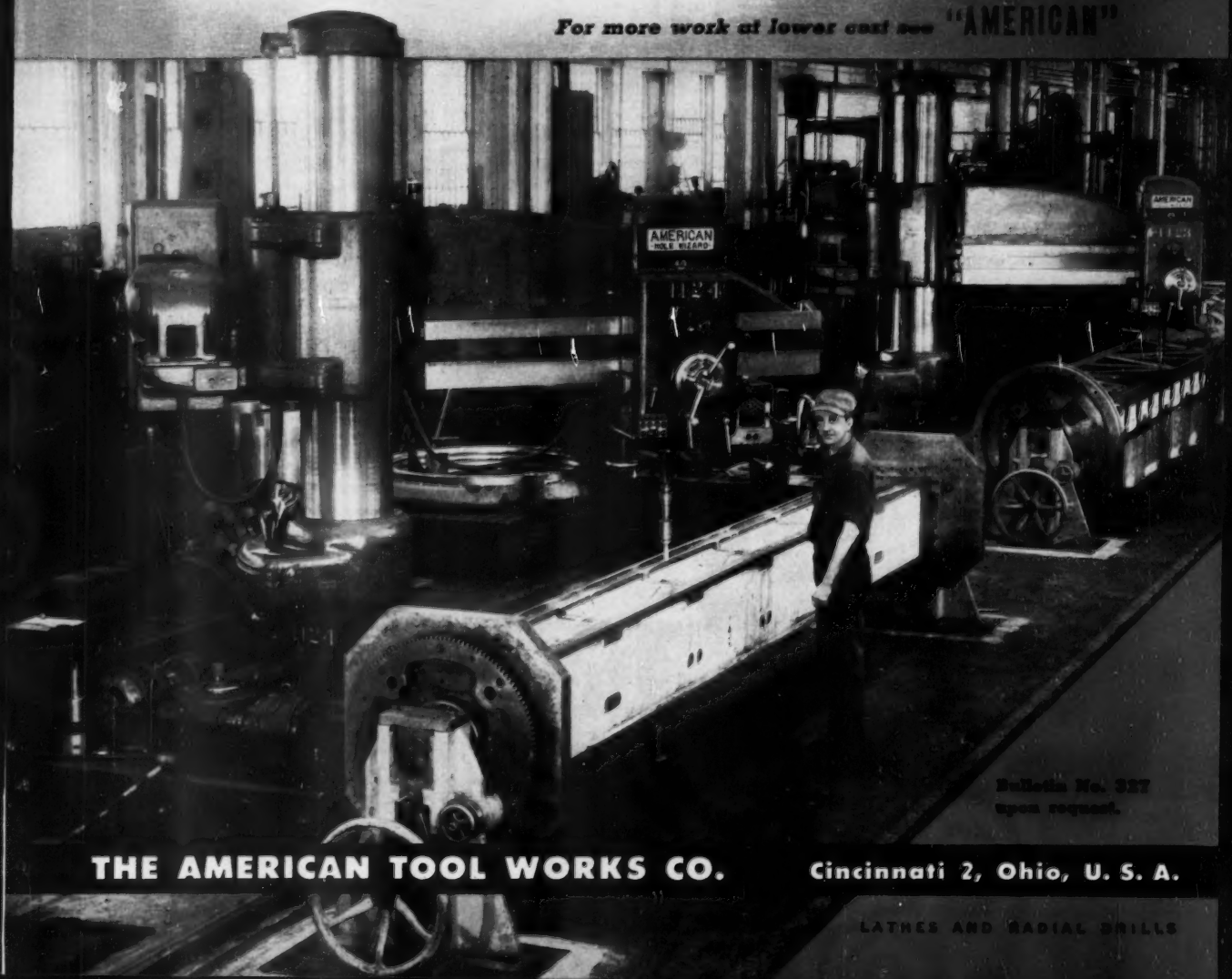
helping to profitably produce the quality products for which Nordberg Manufacturing Company of Milwaukee, Wisconsin is known the world over.

These "AMERICAN" Track Type Hole Wizard Radials mounted on mobile bases speed up drilling, tapping and boring operations in long, heavy work pieces by bringing the tool to the work rather than moving the work to the tool.

The work pieces are mounted in elaborate trunnion jig fixtures so different work planes may quickly be presented to the tool and a high degree of accuracy maintained.

The quality of Nordberg products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.

For more work at lower cost see **"AMERICAN"**



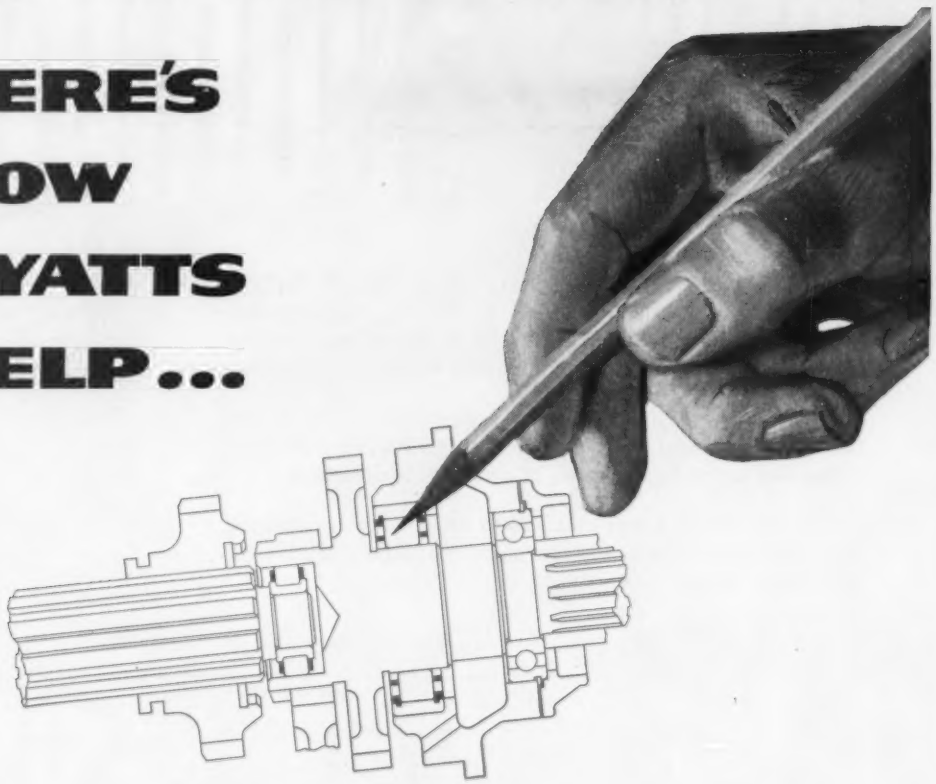
Bulletin No. 327 upon request.

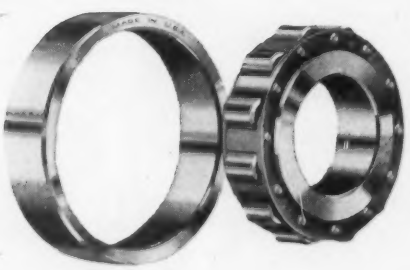
THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

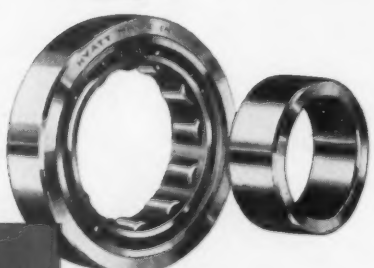
LATHES AND RADIAL DRILLS

when LIMITED SPACE is a design factor

HERE'S HOW HYATTS HELP...







Sometimes a fraction of an inch is the difference between a simple design modification and costly re-tooling. And the engineer who is thoroughly familiar with Hyatt Roller Bearings will know a lot about how to save those fractions. He'll know, for example, that to gain greater shaft rigidity with the same size housing, he need only check his Hyatt catalog for a separable inner race type of bearing. This type—available in a wide range of sizes—may be applied with the rollers operating directly upon the surface of a suitably hardened and ground shaft. Thus, a larger-diameter shaft may be used without sacrificing bearing capacity, or a larger-size bearing may be used without changing the size of the shaft. For a copy of Hyatt's latest catalog, No. 150, write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

See what you can shake out of that cost sheet...

when you decide to SIMPLIFY and SAVE on lubrication!

You can reduce more than one column of cost figures... save real money... when you let *a few* Pure Oil multi-purpose lubricants do the work which normally requires dozens of separate oils and greases. Pure Oil, you see, specializes in industrial lubricants, each of which is formulated to do *many different jobs equally well.*

Not only do you save on the number of lubricants, but you save on *man-hours* and *machine maintenance* too. Your whole plant lubrication system—from purchasing to inventory to application—becomes simpler, faster and surer . . . saves time, saves machines, *saves money!*

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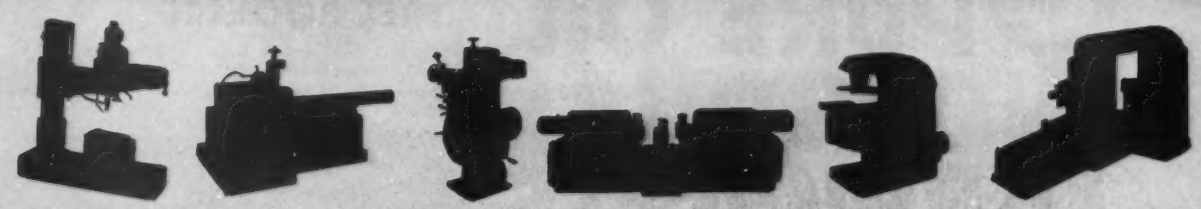
Builders of medium and heavy Long Bed Milling Machines with independently controlled milling carriages through electro-hydraulic operation.

Illustration shows machine specially designed for milling rotor slots and for work on heavy frames, bonnets, and large miscellaneous types of castings.

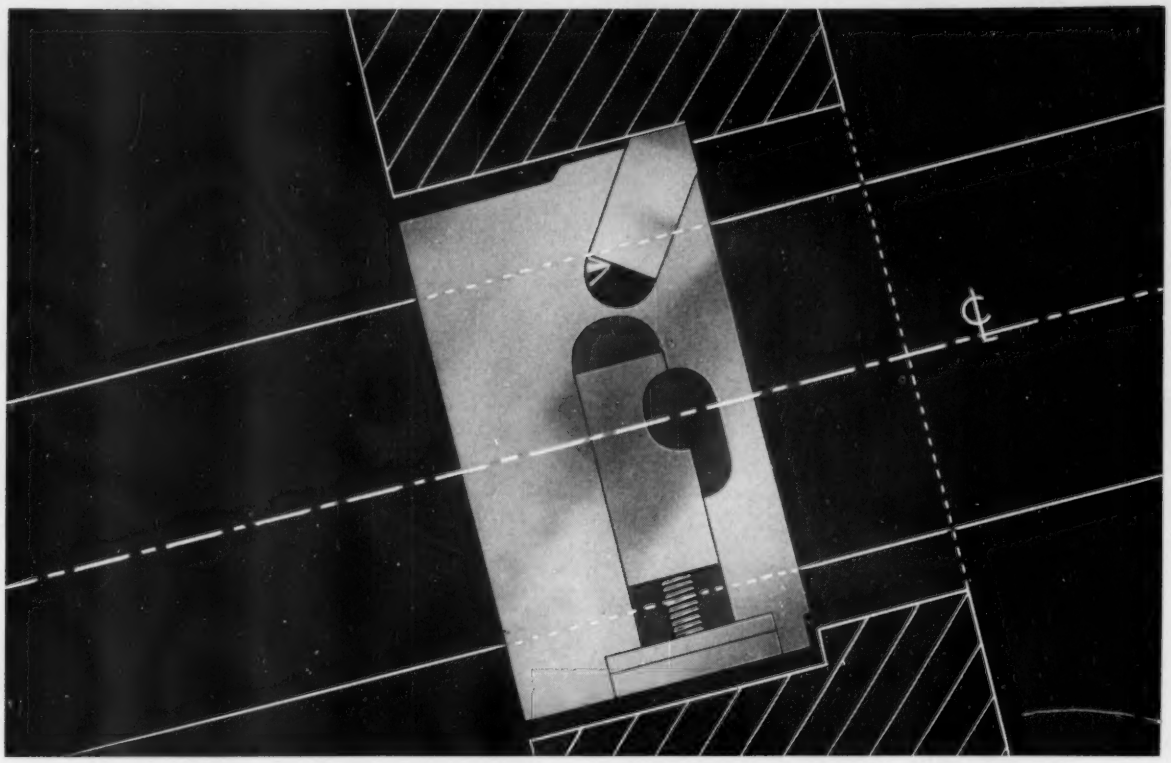
Available in smaller machines from 15 HP rated carriages up to 400 HP milling carriages.

Importing Heller Machines Since 1926

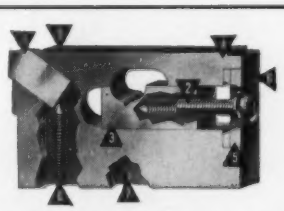


DRILLING MACHINES | COLD SAWING MACHINES | SAW SHARPENING MACHINES | TRANSFER AND SPECIAL MACHINES | KNEE TYPE MILLING MACHINES | PLANER TYPE MILLING MACHINES

Get fast, positive line boring accuracy for 2½" to 17" dia. with...



DAVIS SINGLE CUTTER MICROMETER ADJUSTABLE BLOCKS



1. Cutter — Carried in stock of HSS or Tungsten Carbide tipped. Other materials per order.
2. Micrometer adjusting screw.
3. Gib—Hardened and precision ground to fit dovetail slot in block, allows for seating and accurately clamping of block with taper lock screw. The taper lock screw clamps the block firmly against the rear of the slot in the same manner as used in the Davis standard block type construction.
4. Keeper Plate — Retains adjusting screw.
5. Keeper Block — Retains adjusting screw.
6. Keeper Screws — Holds assembly in block.
7. Centers—For circle grinding cutter on diameter.
8. Cutter Support Screw — Supports and adjusts cutter for regrinding purposes.
9. Cutter Lock Screw—Locks cutter firmly in place.
10. Cover Plate — (Not Shown). Dovetailed to fit block prevents entrance of foreign matter into gib and screw assembly.

HERE's the way to boost efficiency on general purpose jobs that demand rigidity and a wide range of cutter adjustments.

In addition to regular line boring with either standard or special bars, Davis tools with the exclusive adjustable feature are easily adapted to counterboring, undercutting, grooving, facing or chamfering. Block and cutter adjust as a unit to assure full cutter support at all settings.

Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

For details, write for bulletin No. 602.

If Davis can't bore it, it can't be done!

DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

Fairbanks-Morse saves floor space,

In machining electric motor shafts, Fairbanks-Morse uses a Hydra-Trace attachment mounted in place of the compound rest on a LeBlond 16" Heavy-Duty Engine Lathe. This shaft is machined from 3¼" 1245 steel bar stock. Rough and finish cuts are run at 318 rpm (average, 325 sfm) with the feed set at .0168 ipr. .012" to .015" surplus stock is left for finish grinding.

slashes tool costs with Hydra-Trace

LeBlond Lathe plus Hydra-Trace replaces two automatics—machines 55 different shafts in lots of 25 to 150.

Before Hydra-Trace, F-M produced its motor shafts on a pair of automatic lathes. Each turned one end of the step shafts; each used seven tools and two tool blocks. Frequent set-up changes—*each requiring eight hours*—more than ate up the time saved by automatic production.

Then Fairbanks-Morse consulted our Chicago office, purchased a 16" Heavy-Duty Engine Lathe equipped with Hydra-Trace. Here are the results:

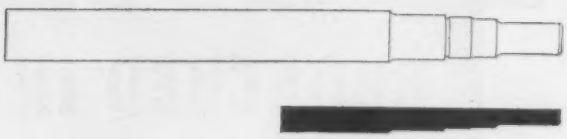
Set-up time became Production Time. Hydra-Trace setup per shaft end takes only 15 minutes—for a total of 30 minutes. Result—7½ former setup hours became available for production.

Floor space saved. One machine does the work of two. (Overall average production is equal.)

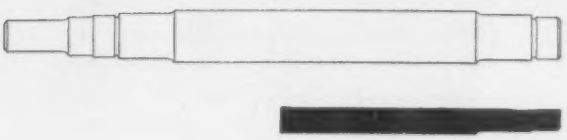
Tool costs slashed. Two tools replace 14. Tool life increased 33%.

Storage problem simplified. Hydra-Trace templates are flat, easily made, much simpler to store and locate than bulky tool blocks (or master shafts).

Hydra-Trace can replace the compound rest of virtually any LeBlond lathe built since 1935. And operators of only average skill can easily operate this heavy-duty, hydraulic tracer.



A typical shaft-turning operation—Hydra-Trace automatically follows template 1 as first-phase rough and finish cuts are taken on one run of shafts.



Then, the shaft ends are reversed. The second template is set and the second machining phase completed.

Whether you are cutting step shafts, contour facing or turning forms—a LeBlond Heavy-Duty Lathe with Hydra-Trace will prove the most versatile, the most dependable machine in your shop. You can use it as a duplicating lathe on production runs; then, in minutes, replace the Hydra-Trace attachment with the standard compound rest for regular work.

For more information on LeBlond Heavy-Duty Lathes, see your nearby LeBlond distributor or write—

THE R. K. LEBLOND MACHINE TOOL CO. CINCINNATI 8, OHIO

Write for Bulletin HT-4A
for the complete Hydra-Trace story.

*TRADE MARK, Registered U.S. Pat. Off.

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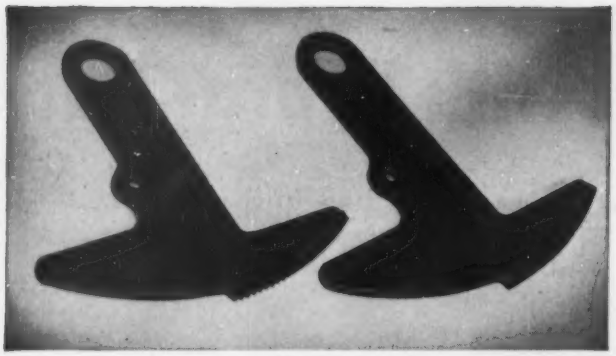
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 64 YEARS



INVOLUTE TEETH and CAM SURFACE

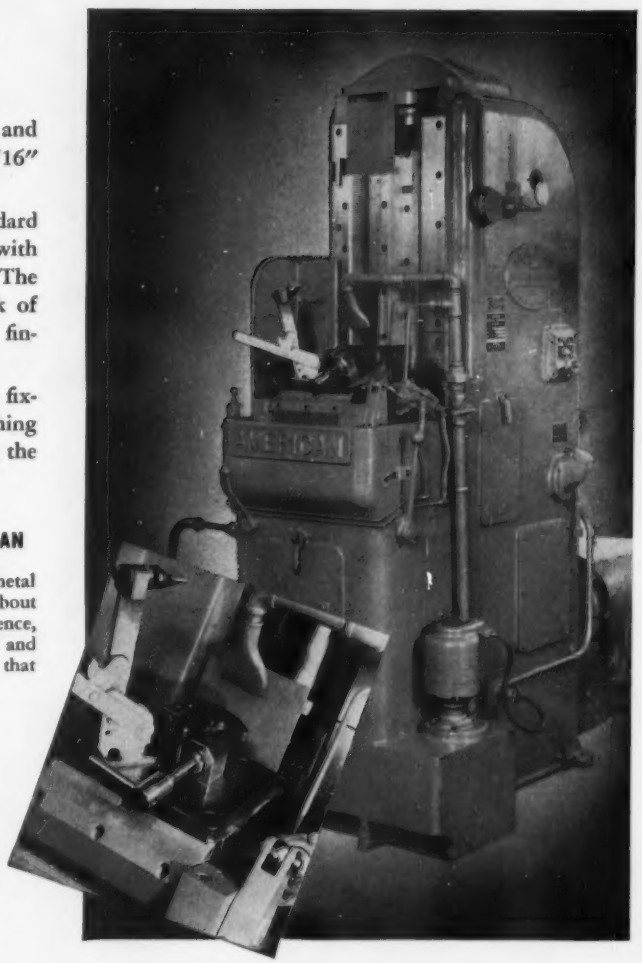
BROACHED IN A SINGLE PASS

500 PIECES PER HOUR

Broaching .015 from the top surface of the cam and gear segment and cutting involute gear teeth 1/16" deep would ordinarily be a two-step operation.

American engineered this job on a standard American T-8-24 3-way type machine equipped with a fixture unit built to hold four blanks at a time. The unit provided complete finishing from the blank of all surfaces in a single stroke, maintaining 500 finished parts per hour production.

The machine cycle is manually controlled. The fixture tilts up automatically at the end of the broaching stroke to permit unloading and reloading during the return stroke.



FOR ECONOMICAL PRODUCTION... CONSULT AMERICAN

If you're looking for low cost per part on a production metal removal operation, why not ask American engineers about broaching? You will get the advantages of their experience, gained through more than twenty-five years saving time and money on every type of broaching. You can be certain that recommendations by American are sound and basic.

American's 3-way machine packs a versatile punch. Write for illustrated bulletin showing the jobs it can do. Ask for Circular No. 100. Address Dept. A.

AMERICAN **American** BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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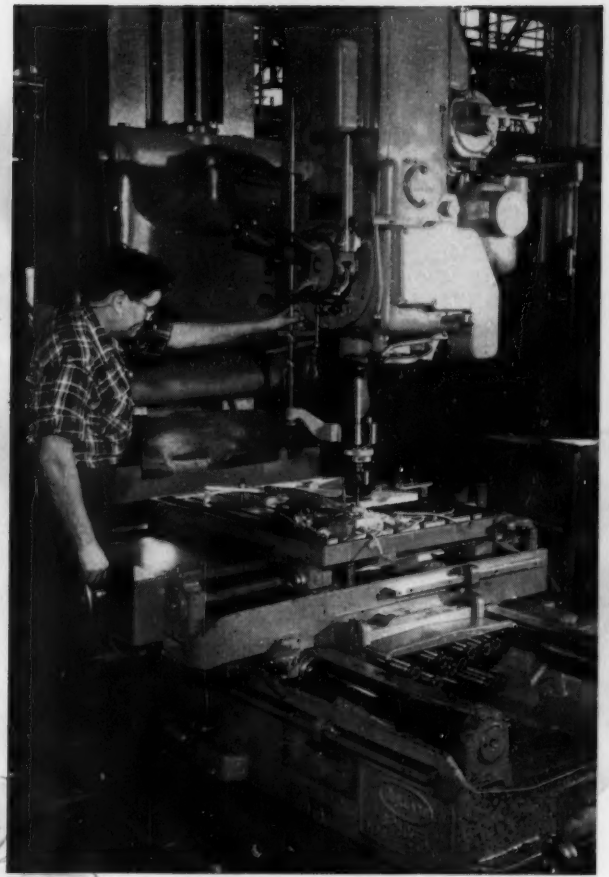
SUNDSTRAND

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

you have PRECISION at your finger-tips with a BULLARD SPACER

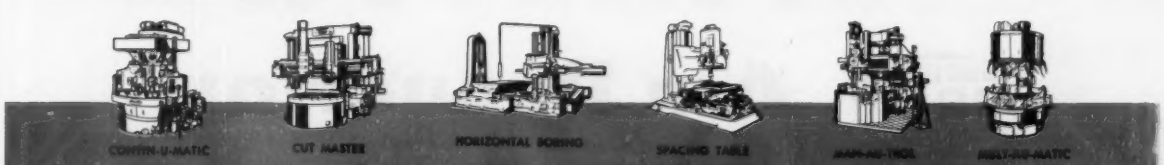


A call to your BULLARD Representative will convince you of the savings a Bullard Spacer will effect in your manufacturing methods, or write to...
The Bullard Company
Bridgeport 2, Connecticut

In plant after plant, in many diversified industries, The Bullard Spacer, day after day is convincing management and shop people alike, that where precision counts it is a "natural."

At the San Diego Division of Convair, a machine shop Superintendent says: "We have found the Bullard Spacer very useful in our work. The machine is simple to operate. It eliminates the necessity of zeroing to a set position. And there is no chance for error, which is important when you make accurate parts for airplanes."

Accurate and precision drilling, reaming or tapping to exacting standards on difficult pieces without the high cost of jigs or fixtures, is maintained with a Bullard Spacer.



THE BULLARD COMPANY · BRIDGEPORT 2, CONN. Telephone 6-2511

NEW!

SPOT WELD without jigs or back-up plates

Now you can spot weld with complete maneuverability — and as fast as you can pull the trigger — with the new portable AIRCOSPOT® Gun.

With **AIRCOSPOT,** Air Reduction's new inert-gas-shielded spot welding unit, you simply touch the water-cooled gun to one side of the work and pull the trigger. In about a second you have a spot weld. It will be a good one, too, because **AIRCOSPOT'S** inert gas shield completely protects the hot metal from contamination by the air.

Write today for prices and folder that provides detailed information.

AIRCOSPOT welds all sheet steels — including stainless up to 3/32" — to bottom sections of varying thickness.

AIRCOSPOT is fast. Once the controls are set, you can make thirty or more welds a minute.

AIRCOSPOT is easy to use. Operators need no special training. The welding cycle is fully automatic.

AIRCOSPOT is handy. Gun weighs four pounds, is nine inches long. All connections—current, gas and water—are through a single control panel.

AIRCOSPOT is rugged. No abuse-sensitive high frequency or electronic circuits, because Gun is of electromechanical design.

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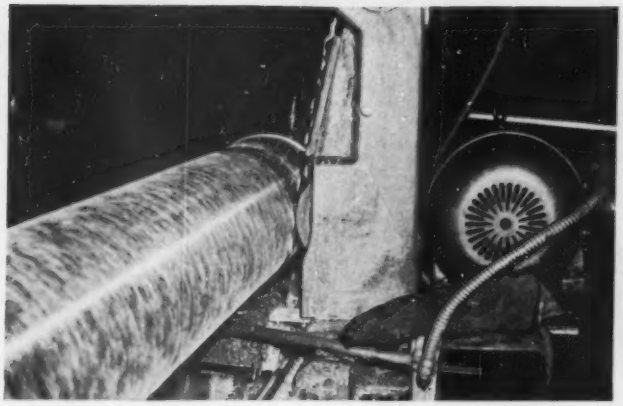
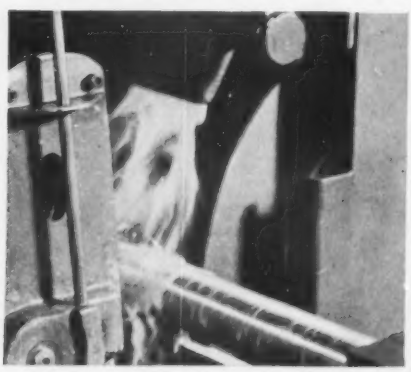


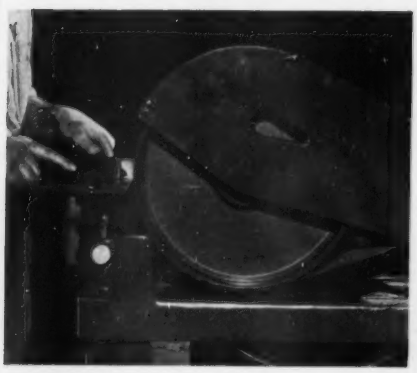
Finishing steel pistons with a wet belt sander which traverses the length of the cylinder.

Removing flash from inside holes with METALITE Cloth Belt.

Some of these recent applications are giving production a big lift



Centerless polishing of cylindrical work with BEHR-MANNING METALITE Belt.



Sharpening carbide tools with BEHR-MANNING Micro-Finishing DURITE® Paper Belt.

Polishing narrow recess in die, with METALITE Cloth SPIRABAND® on portable tool.

Polishing the concave section of a golf club with a flexible belt and buff-type wheel.

METALITE® Cloth Belt removes casting edges and deburrs white metal statues.

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production tool...

BEHR-MANNING® Coated Abrasives

By leaps and bounds, this high potential productive tool of the metalworking industry has become a major factor in industry today. Methods that yesterday were experimental, have quickly demonstrated their value, and now standard machinery is manufactured to make widespread application possible.

The latest mechanized methods of applying coated abrasives in a more productive way, are represented in BEHR-MANNING Demonstration Rooms, strategically located over the country. Visit the one near you—see the latest time-saving equipment—try it out on your work—and find new ways to cut costs. No obligation—just 'phone your local BEHR-MANNING Representative or write Behr-Manning Corp., Troy, N. Y., Dept. AM-2.

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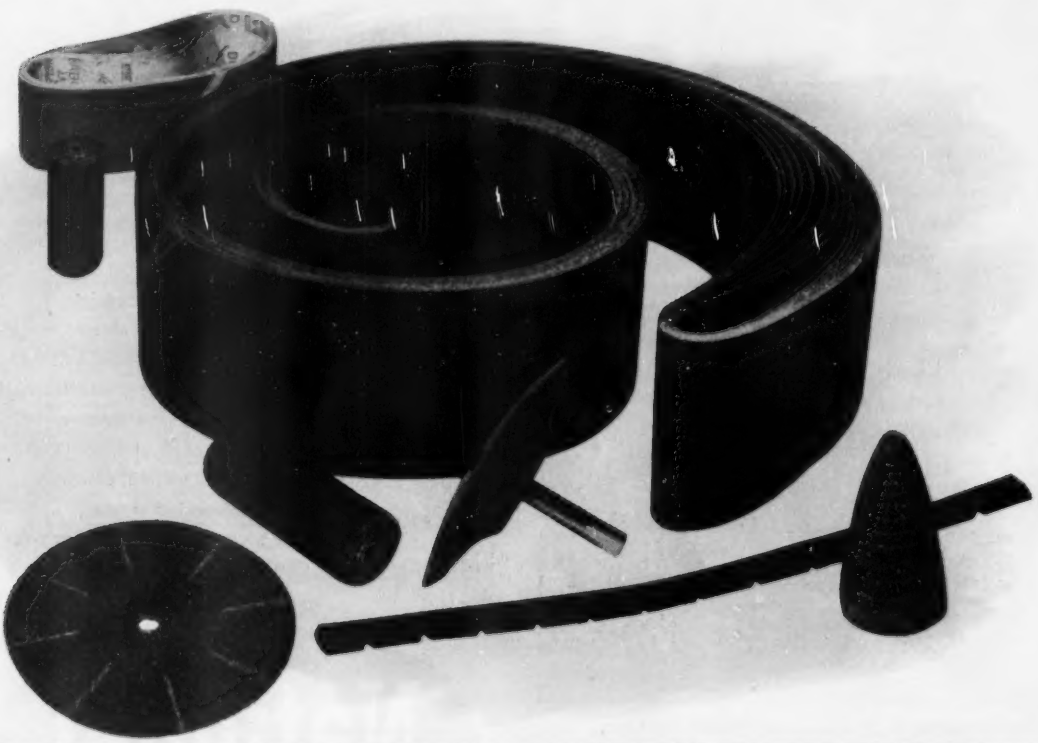

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Years of successful experience in special tooling and related production problems are yours for the asking. When the job requires special cutting tools call in your National Tool Co. representative. He is backed by more than 49 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Representatives in major industrial centers

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

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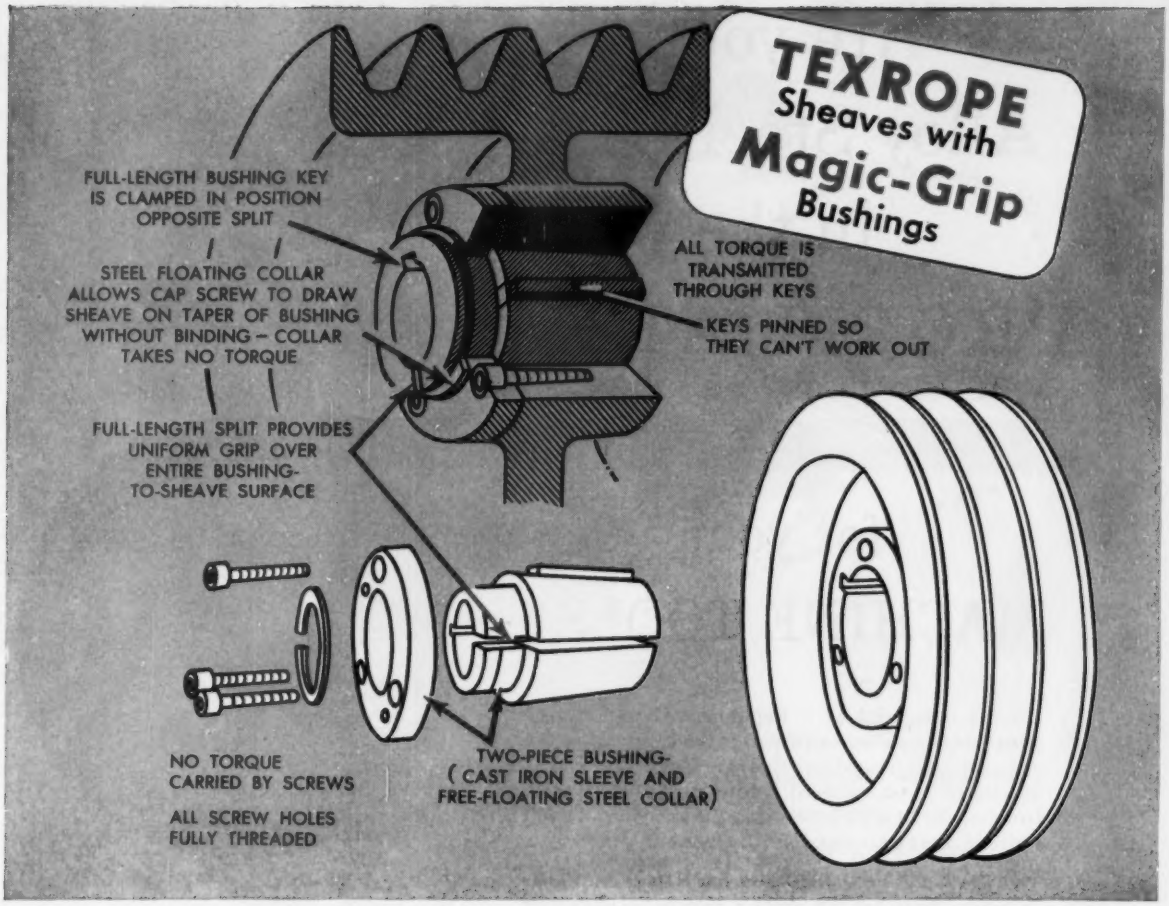
TEXROPE
Sheaves with
Magic-Grip
Bushings
FULL-LENGTH BUSHING KEY IS CLAMPED IN POSITION OPPOSITE SPLIT
STEEL FLOATING COLLAR ALLOWS CAP SCREW TO DRAW SHEAVE ON TAPER OF BUSHING WITHOUT BINDING – COLLAR TAKES NO TORQUE
FULL-LENGTH SPLIT PROVIDES UNIFORM GRIP OVER ENTIRE BUSHING-TO-SHEAVE SURFACE
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ALL SCREW HOLES FULLY THREADED
TWO-PIECE BUSHING- (CAST IRON SLEEVE AND FREE-FLOATING STEEL COLLAR)

Get the **Only** Sheave with ALL the Most Needed Features

Here's Comparison of *Magic-Grip* Sheave and Other Sheaves

	Magic-Grip Sheaves	SHEAVE A	SHEAVE B	SHEAVE C
Bushing fully split for uniform clamping action.	Yes	Yes	No	Yes
Load carried by keys instead of threaded bolts.	Yes	No	No	No
Bushings cover full range of NEMA "probable" shaft diameters.	Yes	Yes	Yes	No
All screws engage full thread.	Yes	Yes	Yes	No
Mounts in one piece.	Yes	No	Yes	Yes
Squares itself with shaft.	Yes	No	No	No

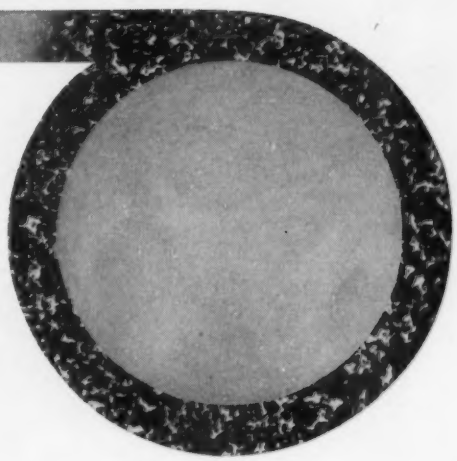
A-4167

Texrope and *Magic-Grip* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

Are your Alloy Steel Bars in the PROFIT AREA for your MACHINE TOOLS?



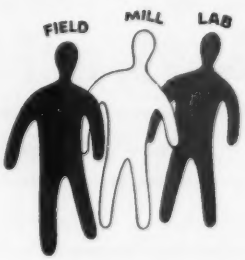
It's the outer rim of a Republic carbon-corrected alloy steel bar that helps you make a profit. In the ordinary heat-treated bar this is a "decarb" area that usually must be removed before parts can be made from stock. In a Republic bar, the carbon has been restored after heat treating . . . right out to the edge.

You don't machine away good metal into chips and shavings. And that can make a substantial difference in your profits.

Republic's 3-Dimension metallurgical service will be glad to show you how you can get in on such savings as these. It works with your metallurgists and production people to adapt cold-drawn carbon-corrected alloy steel bars to your product. The combined extensive experience and abilities of Republic Mill, Field and Laboratory metallurgists are added to the knowledge and skills of your engineers.

The result often means better products at reduced costs. Get in touch with your Republic Steel salesman. He can arrange for a Republic metallurgist to call at your convenience.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

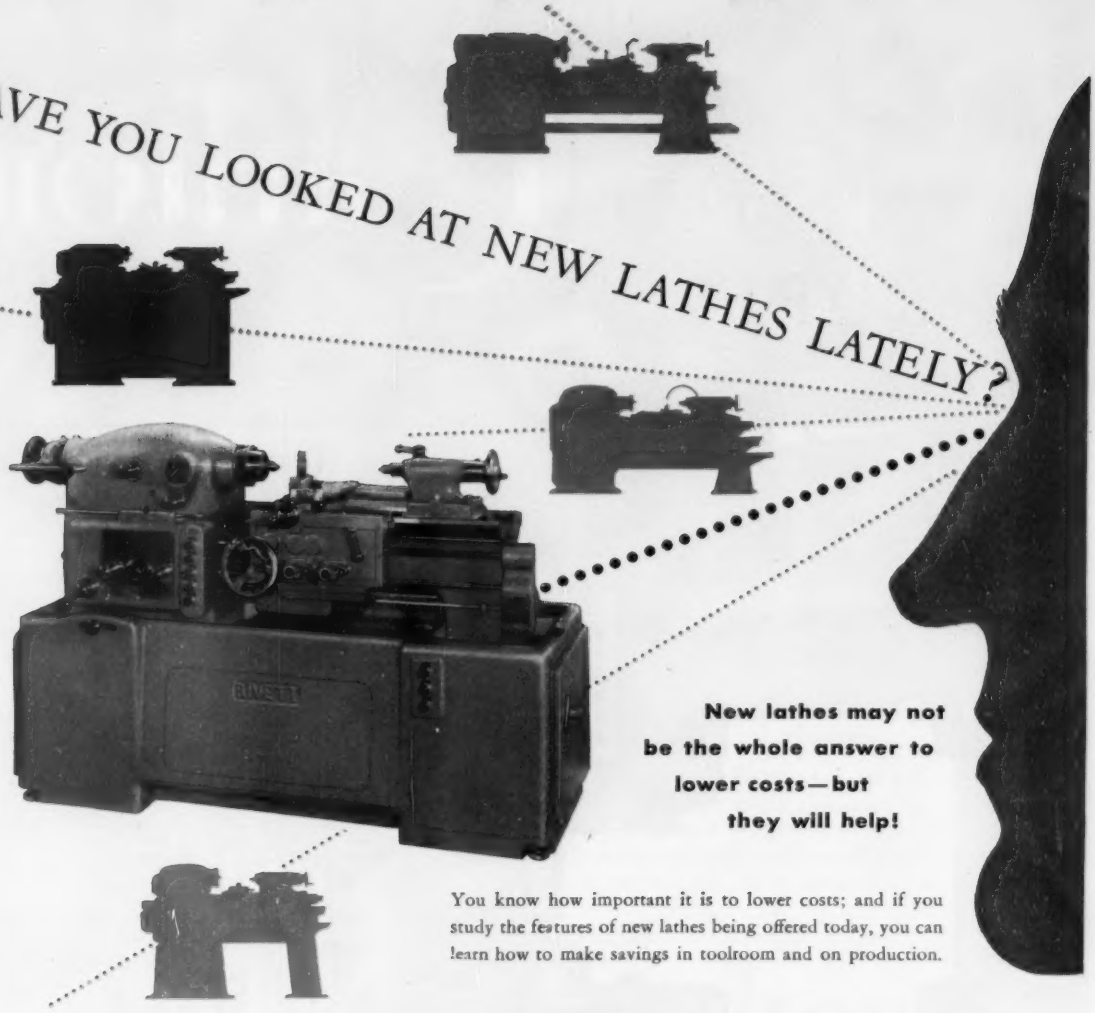


3-Dimension Metallurgical Service
combines the extensive experience and co-ordinated abilities of Republic's *Field, Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide users of Alloy Steels in countless industries to the correct steel and its most efficient usage, IT CAN DO THE SAME FOR YOU.

Republic ALLOY STEELS

REPUBLIC STEEL

HAVE YOU LOOKED AT NEW LATHES LATELY?



New lathes may not be the whole answer to lower costs—but they will help!

You know how important it is to lower costs; and if you study the features of new lathes being offered today, you can learn how to make savings in toolroom and on production.

Rivett offers two lathes for one!

This observation is particularly true if you look at the new Rivett Model 1020S Precision Toolroom Lathe. It features sensitivity for turning tolerances within .0004″; and heavy biting ruggedness for a ¼″ cut at .020″ feed in cold rolled steel. In short, it is an instrument lathe and an engine lathe combined to handle any work within its 12½″ swing and 20″ centers.

26 Features Distinguish Rivett 1020S

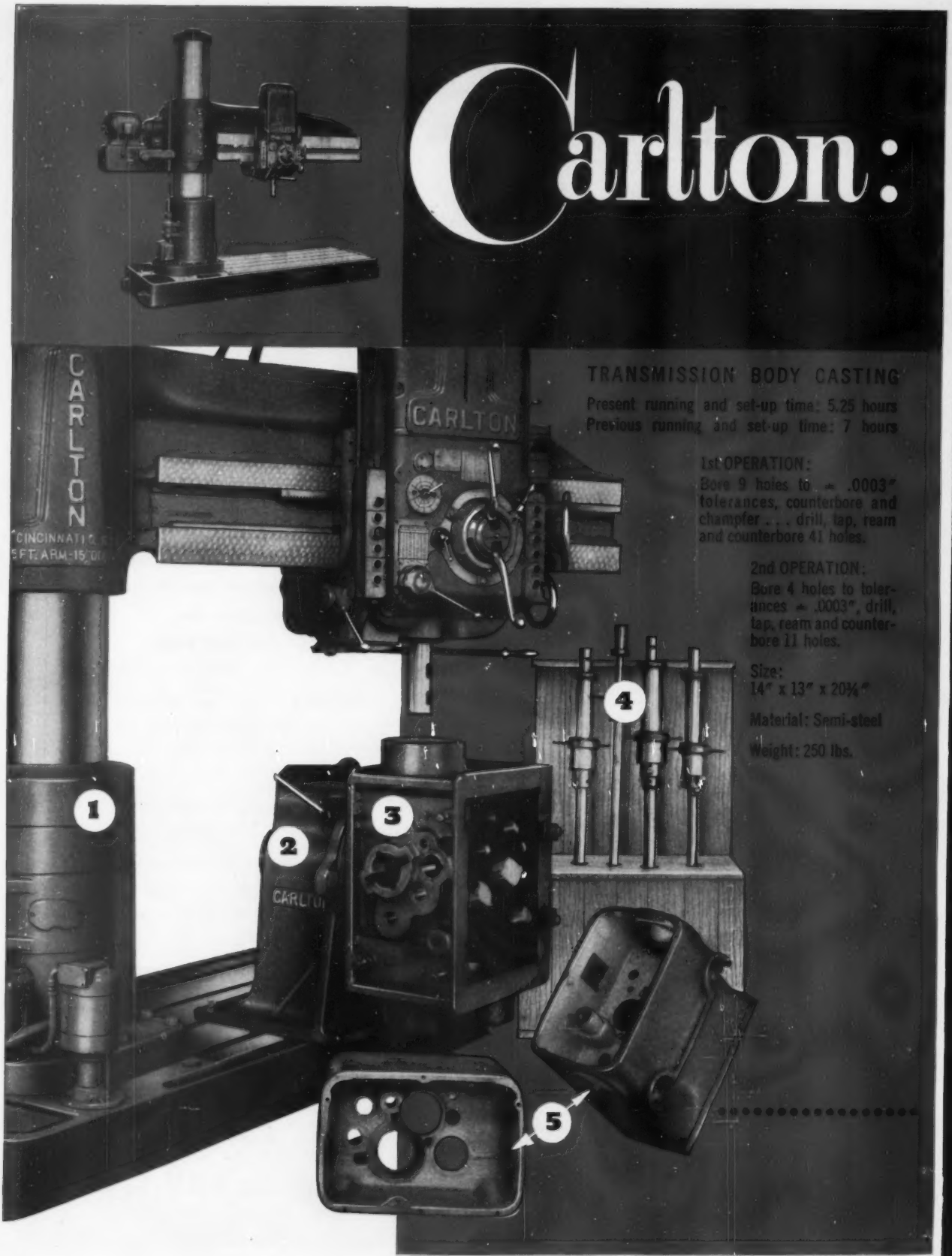
The Rivett Model 1020S is head and shoulders above any ordinary lathe. Its design includes 26 individual qualities that substantiate Rivett's reputation for extreme precision and economical production.

Write for free catalog

Why not write for the new Rivett Catalog 1020B and read these important 26 features—compare them with the designs of other makes of lathes—and thereby realize what a Rivett can do for your shop in the way of time and money (not to mention how happy it will make any *real* machinist to work with such *real* precision!)

RIVETT

RIVETT LATHE & GRINDER, INC., DEPT. AMR 2, BRIGHTON 35, BOSTON, MASS.


Carlton:
TRANSMISSION BODY CASTING
Present running and set-up time: 5.25 hours
Previous running and set-up time: 7 hours
1st OPERATION:
Bore 9 holes to ± .0003" tolerances, counterbore and champfer . . . drill, tap, ream and counterbore 41 holes.
2nd OPERATION:
Bore 4 holes to tolerances ± .0003", drill, tap, ream and counterbore 11 holes.
Size:
14" x 13" x 20¼"
Material: Semi-steel
Weight: 250 lbs.
CARLTON
CINCINNATI
5 FT. ARM-15
1
2
3
4
5

THE PRODUCTION RADIAL DRILL

Carlton radial drills, properly tooled, will lower costs over the horizontal method

Drilling and boring accurately located holes isn't usually considered a production operation for a radial drill. However, when fitted with master trunnion and appropriate jigs, Carlton radial drills do this work accurately, quickly *and on a production basis!*

The transmission body shown here is a perfect example of production hole drilling on a Carlton. Using this set-up, many more operations are performed in the Carlton radial drill . . . at a terrific saving in handling and running time over the previous method.

Previously the transmission body was processed with the horizontal boring method included. The new tooling set-up worked out by Carlton engineers effected a 25% savings by circumventing the boring operation previously done in a horizontal plane. Using the horizontal method, the transmission body had to be handled four times . . . now it's handled but twice!

And Carlton radial drills are perfectly suited to production drilling. The push-button control simplifies and speeds up operation. The low hung drive assures the necessary rigidity. And the accuracy and precision with which the Carlton column clamp performs eliminates the need for operator to clamp and unclamp the column until the boring bar moves freely in the pilot bushings, thus assuring long life to boring bar and pilot bushings.

Carlton engineers will be glad to work with your engineers in recommending the most efficient tooling for your Carlton radial drill . . . to show you how the radial drill can be a real production machine tool, particularly if it's a

Carlton

THE CARLTON MACHINE TOOL CO.
Cincinnati 25, Ohio, U. S. A.

CARLTON ENGINEERED TOOLING SET-UP

1. Carlton 3-A radial drill
2. Master trunnion
3. Jig
4. Boring bars
5. Transmission body casting

Gentlemen:

Have your representative call and show us that Carlton is the *production* radial drill.

*Name*_____

*Company*_____

*City*_____ *Zone*____ *State*_____

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BOOST 80 PSI AIR

Input Range: 40 to 3000 psi Air or Fluid

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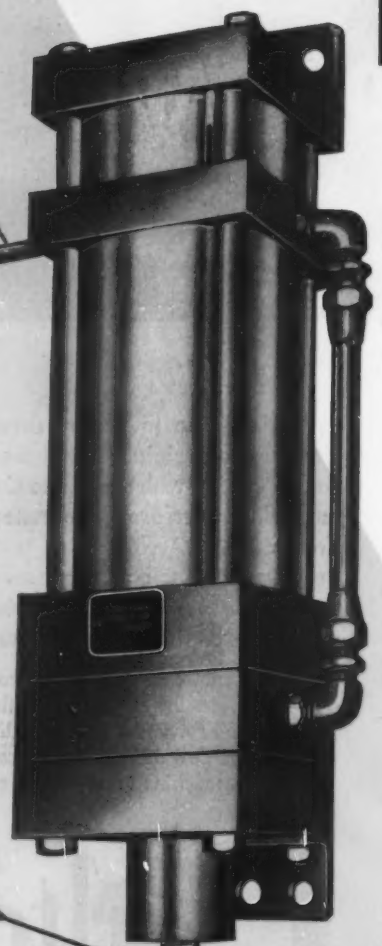
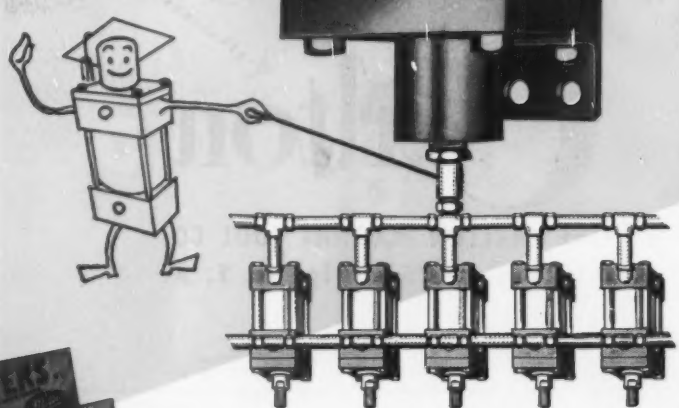
Output Range: 200 to 10,000 psi Fluid





- Save space, weight and investment cost by replacing pump installations in many applications
- Less costly to install, operate and maintain
- **Hold pressure indefinitely** without the motion and heat generation of ordinary pump circuits
- Provide — at point of cylinder thrust — more efficient power with less weight in less space than direct driven air cylinders
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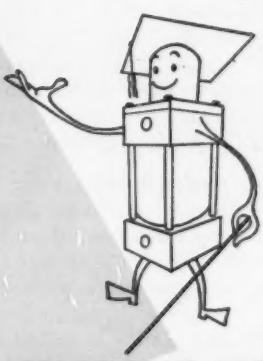
- Operate at speeds of 30 to 450 strokes per minute



ESPECIALLY RECOMMENDED FOR

- **WELDING**
- **PUNCHING**
- **SHEARING**
- **CLAMPING**
- **RIVETING**
- **CRIMPING**
- **PRESSING**

and similar applications

FULL DETAILS IN MILLER BULLETIN B-200 SENT FREE ON REQUEST
Other Miller products include: Air cylinders, 1½" to 20" Bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

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Miller

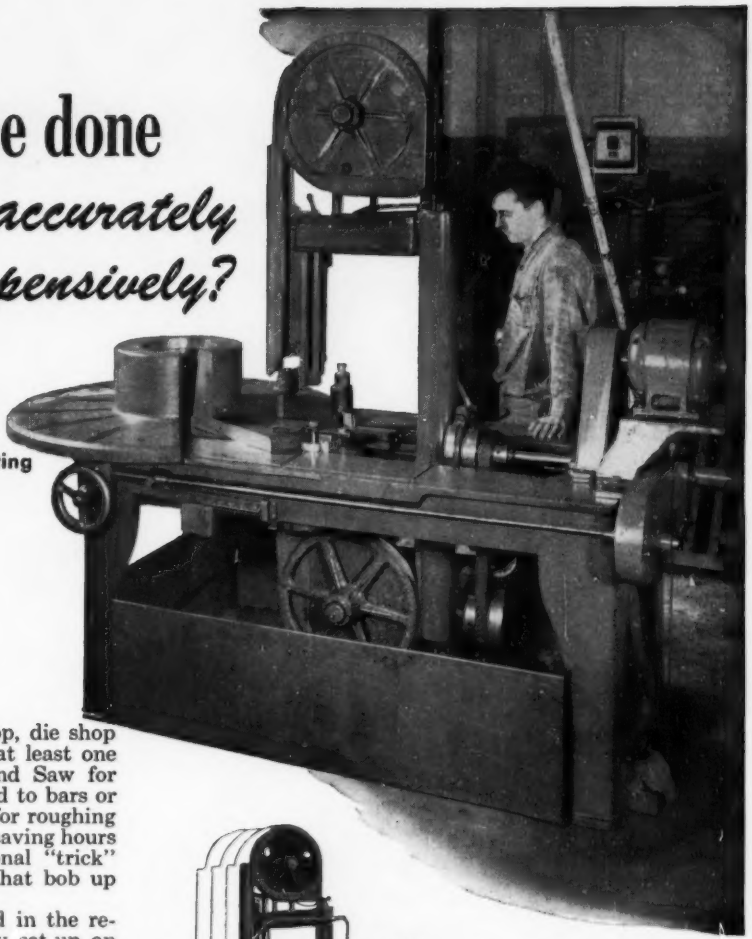
MILLER MOTOR COMPANY

2004 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

How else could this job be done

so easily, so accurately and so inexpensively?

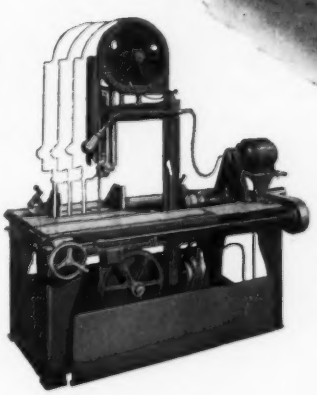


Segmentation of 42″ Steel Casting

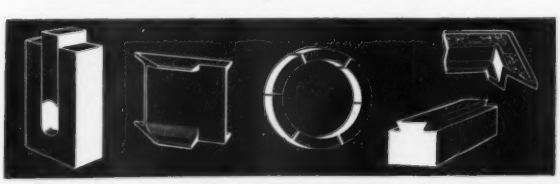
Every tool room, machine shop, die shop and maintenance department needs at least one No. 8 MARVEL Metal-cutting Band Saw for cutting off anything from ⅛″ drill rod to bars or billets of 18″ x 18″ cross-section . . . for roughing large work to size and shape, thereby saving hours of machining . . . for those occasional "trick" jobs, impossible on any other saw, that bob up in every plant.

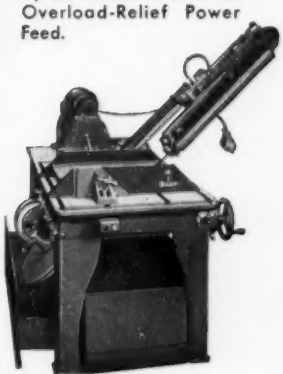
Odd shapes that can't be held in the removable, quick-action vise, are easily set-up on the No. 8's large, T-slotted work table. MARVEL Overload-Relief Power Feed insures accurate cuts under the most adverse conditions because blade pressures are automatically held within limits which are pre-set instantly for each job. The blade is never forced beyond its capacity to efficiently and accurately remove metal . . .

Close limits are further assured through the work being clamped rigidly to the bed of the saw and the blade power-fed through it instead of pushing the work through the blade. This is also true in miter cutting, as the blade column—*not the work*—is swung to the required angle. The handiest, most versatile machine tool, it is also the busiest in most shops.



This double exposure illustrates how the blade maintains its vertical position while moving into and through the work, impelled by the automatic MARVEL Overload-Relief Power Feed.





Column set at angle to cut 45° miter on 18″ beam. Entire saw column can be swung to cut at any angle from vertical to 45° right or 45° left.

MARVEL *Metal Cutting* **SAWS**

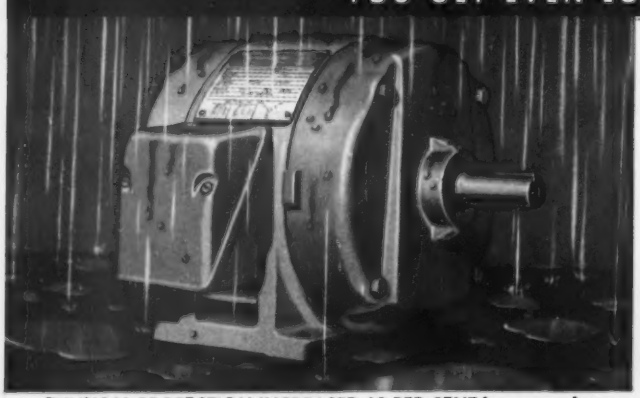
Better Machines–Better Blades

Write for Catalog

ARMSTRONG-BLUM MANUFACTURING CO.

5700 Bloomingdale Avenue *"The Hack Saw People"* **Chicago 39, U. S. A.**

YOU GET EVEN LONGER MOTOR LIFE



PHYSICAL PROTECTION INCREASED 60 PER-CENT by a complete redesign of cast-iron frame and end shields. This motor is suitable for many jobs where ordinary dripproof motors should not be applied.

EXTRA ELECTRICAL STRENGTH is assured by use of new polyester film insulation. A silicone coating, Dri-film,* virtually eliminates stator insulation failure caused by moisture.

*REG. U.S. PAT. OFF.

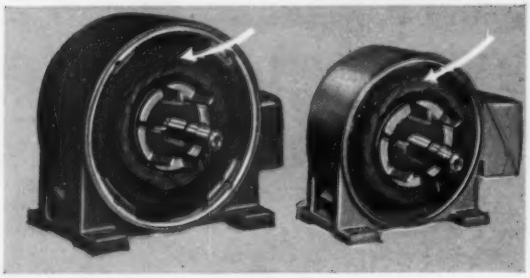
TRI 55 CLAD THE LEADER IN MODERN MOTOR DESIGN

REG U S PAT OFF

GENERAL ELECTRIC ANNOUNCES...

THE ALL-NEW TRI 55 CLAD MOTOR

REG. U.S. PAT. OFF.



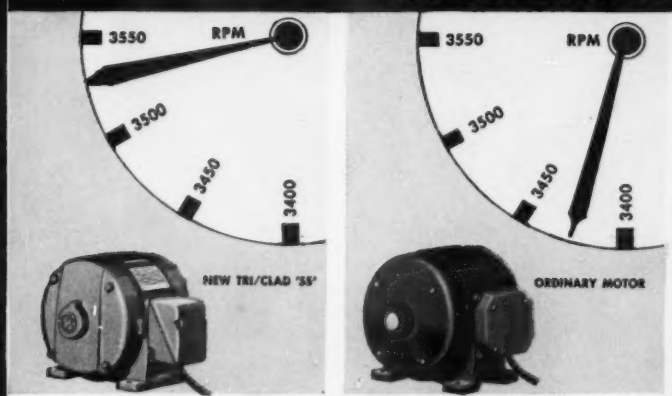
LIGHTER, SMALLER Tri/Clad '55' motors have been made possible through better use of space within the frame. Active materials (magnetic steel, copper) have not been sacrificed.

Complete Line of Dripproof, Enclosed Motors and Gear-Motors Available in Most Ratings in 1954

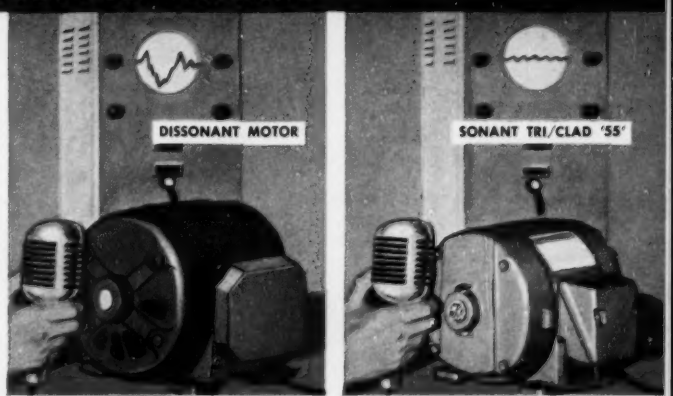
Here's the all-new Tri/Clad '55' motor — now available in NEMA 182 and 184 frame sizes.

You can get complete information on this dramatic motor achievement by writing for bulletin GEA-6013 on Tri/Clad '55' Dripproof motors, GEA-6012 on Tri/Clad '55' Enclosed motors, or GEA-6027 on Tri/Clad '55' Gear-motors, or by contacting your nearby G-E Apparatus Sales Office or G-E Motor Agent. General Electric Company, Section 648-1, Schenectady 5, N. Y.

YOU GET EVEN BETTER PERFORMANCE



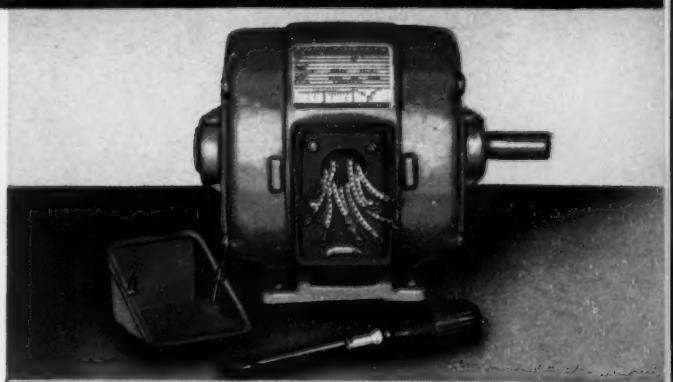
HIGHER FULL-LOAD SPEEDS is only one of many improved characteristics of this new G.E. motor. Above shows comparison of an ordinary motor with the Tri/Clad '55' — both rated at 3600 rpm.



SONANT OPERATION of the new Tri/Clad '55' motor has been laboratory tested and proven. Motor operates at reduced noise level, and operating sound is pitched to a more pleasant frequency.

YOU GET EVEN MORE INSTALLATION AND MAINTENANCE SAVINGS

NEW BEARING SYSTEM allows this motor to run longer than other motors without regreasing. One reason—greatly improved synthesized grease with 8 times the mechanical stability of ordinary grease.



EASIER TO SERVICE, the new Tri/Clad '55' has larger conduit box diagonally split for simplified wiring. Perma-numbered leads mean that even clipped and stripped wires are instantly identified.

Progress is our most important product

GENERAL ELECTRIC

KRW HYDRAULIC PRESS DOES 4 VITAL JOBS ON POLE-SETTING DERRICKS

BATAVIA METAL CORP. bought a K. R. Wilson 75 ton motor-driven Hydraulic Press two years ago to perform a few routine operations on their pole-setting derricks (derrick shown on telephone truck below). But they soon found that the amazing versatility of the press—the ease and speed with which it can be converted from one set-up to another, makes it a natural for all kinds of trouble shooting. Below are just a few of the jobs their KRW press does.

1. SETTING RIVETS in side legs and front braces of pole-setting derricks. Thanks to their KRW press, Batavia Metal has eliminated loosening of rivets and the resulting loss of valuable production time.

2. COSTS CUT 33⅓% The center hole on derrick foot plates must be 1½" in diameter, flanked by two 11/16" holes. Originally the company drilled three 11/16" holes on a small drill press, then moved the plates to the machine shop where the center eye-bolt hole was reamed out to 1½" diameter. Use of a simple die plus the KRW press produces all three holes in one stroke and eliminates the drilling and reaming operations, cutting costs by more than ⅓.

3. FORMING BRACKET U'S for derrick mountings on front of trucks and riveting the lower sections of front mountings are two more jobs done quickly, accurately and efficiently on the KRW Hydraulic Press.

4. FORMING BASES for ratchet jacks and restoring proper contour to various castings which sometimes warp as they cool are also regular assignments for this KRW press. Company officials tell us that their KRW Hydraulic press is in use the greater part of every working day!

Any pressing problems in your plant? Check with K. R. Wilson for the right press to do the job. KRW Hydraulic Presses come in one, two and three cylinder models; 25 to 150 ton capacities; hand operated, air operated or motor driven. For facts and prices contact your machinery dealer or write, wire or phone

***IMMEDIATE DELIVERY** on type of press shown above up to 75 ton capacity, hand, air or motor driven.*

K. R. WILSON

210 MAIN STREET BUFFALO 3, N. Y.

DESIGNERS AND BUILDERS OF HYDRAULIC PRESSES TO SOLVE ANY METALWORKING PROBLEMS

Ford Cuts Assembly Costs using

ROLLPIN TRADE MARK

*Rollpins applied as differential pinion pin lockpin on the Ford Motor Mound Road Plant assembly line.

Rollpin is the slotted tubular steel spring pin with chamfered ends. Simply drive it into holes drilled to normal production tolerances. It compresses as driven—and its spring action locks it in place regardless of impact loading, stress reversals or vibration.

Rollpin assembly eliminates extra operations and parts. There is no precision drilling, threading, peening—and no cotter pins or other locking devices. Cost savings as great as 90% result—depending upon the type of fastener replaced and the assembly method now in use. Our illustration is an air gun set-up that installs Rollpin at the rate of 8 units a minute on the Ford assembly line.*

Other insertion procedures range from simply driving Rollpin with a hammer to more intricate hopper-fed methods. Independent time studies have shown installed costs of Rollpin at 9% of that for a dowel pin and *less than 5%* of the installed cost of a taper pin.

Mail our coupon for information on how Rollpin will do your fastening faster and cheaper.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R23-29, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

☐ Rollpin bulletin ☐ ELASTIC STOP® nut bulletin
☐ Here is a drawing of our product.
What ESNA® fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

From Sinclair Research Comes

An IMPROVED hydraulic oil

SINCLAIR DURO

4 vital inhibitors assure protection against rust – oxidation – foam

Sinclair DURO Hydraulic and Machine Oil was developed by Sinclair's Research Laboratory, Harvey, Illinois, to meet the requirements and demand for a quality hydraulic oil – an oil which would assure sensitive hydraulic system control and operation.

Sinclair DURO Oils have *unusually high oxidation resistance* to combat corrosive materials, varnish and sludge formation. The inclusion of Sinclair's rust inhibitor *protects metal surfaces* against rusting in systems where frequent shutdown causes moisture condensation. Sinclair's rust inhibitor "plates out" on a metal surface for maximum rust prevention. Moreover, Sinclair DURO Oils have *extremely effective anti-foam characteristics* which prevent foam-promoting air bubbles from remaining in suspension.

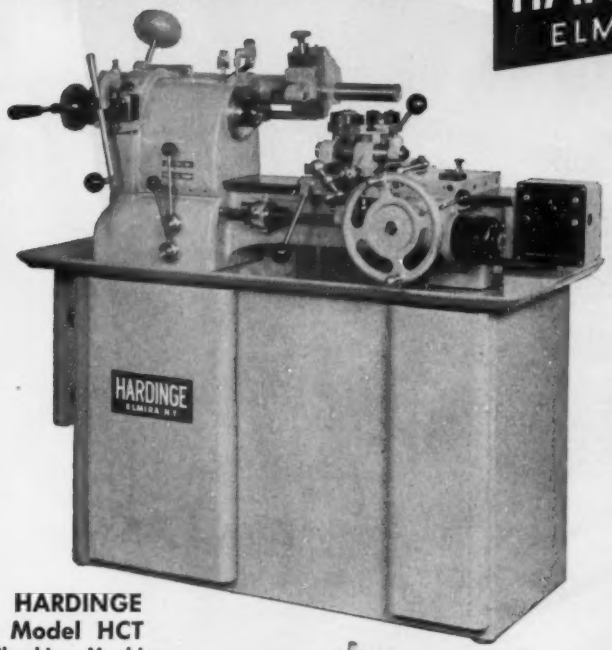
These are only some of the reasons why Sinclair DURO Oils permit smoother, full-powered transmission for high productivity. For further information why not call your local Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR

Precision PRODUCTION MACHINES

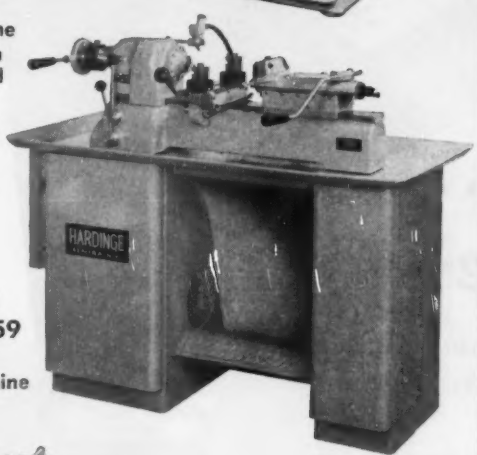
HARDINGE
ELMIRA, N.Y.

Precision TOOL ROOM MACHINES

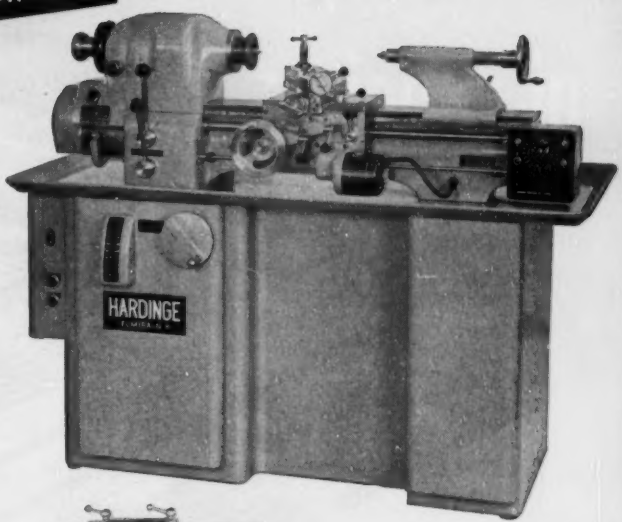


HARDINGE
Model HCT
Chucking Machine with Production Threading Head

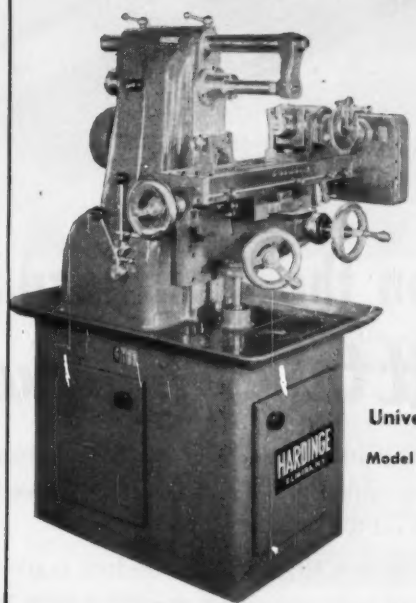
Also Model HC Chucking Machine without Production Threading Head



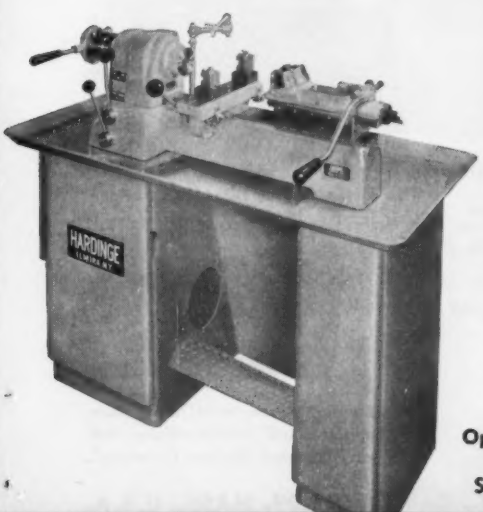
HARDINGE
Model DSM 59
Second Operation Machine



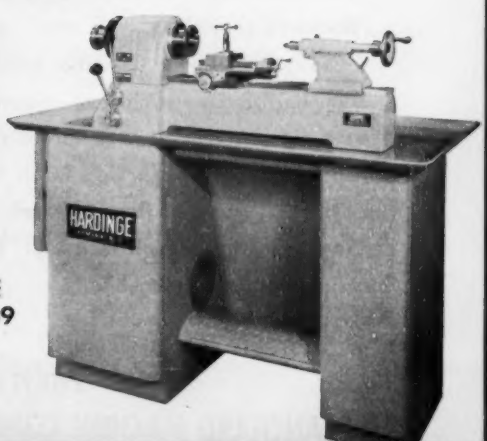
HARDINGE
Model HLV
Tool Room Lathe



HARDINGE
Model UM
Universal Milling Machine
Also
Model TM Plain Milling Machine



ALL MACHINES
Feature
HARDINGE Preloaded Ball Bearing Spindle Construction for High Speeds



HARDINGE
Model VBS
Second Operation Machine with Stationary Collet

HARDINGE
Model DV 59
Lathe

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

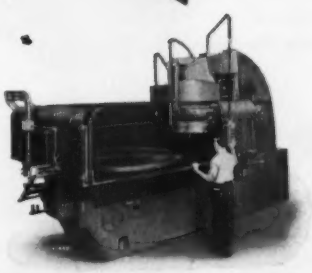
Put it on the Blanchard . . .
it takes 1/5th the time!

Here is another example of the high production attainable while grinding to extremely close tolerances with Blanchard Surface Grinders and Blanchard Wheels.

It formerly took 45 hours, floor-to-floor, to grind these nine hardened steel machine tool ways. They are 2½" x 3½" x 50" and hardened to Rockwell C-60-63.

Now, these highly desirable results are obtained, using a No. 42-72-84 Blanchard Surface Grinder — nine are placed on the chuck and ground on 6 sides, removing .015" from each surface, parallel to .001", flat within .001" with surface finish of 5 micro-inches. The Blanchard **cut time to 9 hours,** floor-to-floor!

No wonder production men say: "Put it on the Blanchard — it takes less time to do a better job".



This is the largest Blanchard Surface Grinder, No. 42-72-84.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

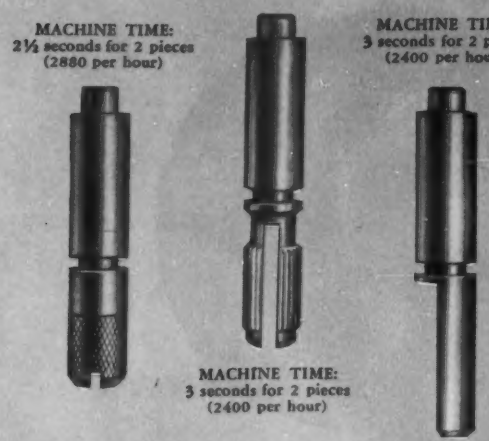
PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

HOW... Chicago Telephone Supply Corpn.

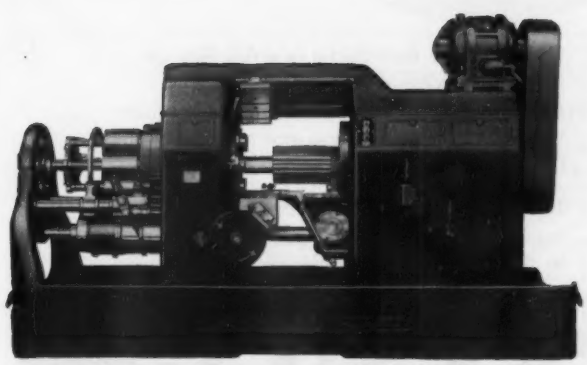
completes these pieces in less than half former time

Each piece is ¼" diam., made from brass rod, each is double indexed, using revolving milling or slotting attachment.



Illustrations reproduced 1½ times actual size.

Saves EXTRA MACHINES, MAN-HOURS, FLOOR SPACE



Acme-Gridley 6-Spindle Bar Automatic. Built in 8 different chuck capacities—from ⅜ to 4".

THIS country's million upon millions of radio and television owners seldom think of the countless millions of bar cut parts, such as these, that help to reduce the purchase price to just about the cheapest units you can buy.

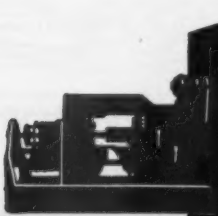
For these continued low costs much credit goes to Chicago Telephone Supply Corpn., at Elkhart, Ind., for 58 years a progressive cost-conscious manufacturing source for parts. For more than 30 of these years this company has depended upon

ACME-GRIDLEY MULTIPLE SPINDLE AUTOMATICS

to supply more and more machines and to devise down-to-date tooling practices for faster output on parts such as shown, and for hundreds of others.

These savings made, if only fractions of seconds per piece, when multiplied by millions or even thousands, more than offset rising costs from other directions. And Chicago's experience parallels that of hundreds of other parts makers whose policy is to keep methods up to date to keep costs down.

→ This much is certain—you must have markets and the sooner you decide to protect them against competition the sooner you will ask our engineers to give you cost cutting facts.



The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

Will the Machines You Buy Today Fill Tomorrow's Needs?

LEES-BRADNER MODEL R
HEAVYWEIGHT HOBBER
Maximum Outside Dia. . . . . 16"
Travel . . . . . 18"
Maximum Helix . . RH 45° – LH 60°
Machine Weight . . . . 13,000 lbs.
Motor Requirements . 15 to 25 HP

How about that machine you're thinking of replacing today? Awhile back it looked pretty good, didn't it? Good enough to fill your needs when you bought it, anyway. But now it can't handle today's job and it must be replaced.

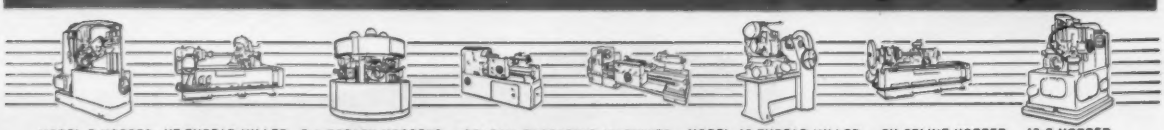
When you buy that new machine—*look ahead.* Don't invest in one that just barely meets today's needs. Think about that extra capacity you'll probably need tomorrow.

Lees-Bradner manufactures a full line of hobbing machines to meet different requirements. If a smaller capacity machine will do your job today—*and tomorrow*—fine, that's for you.

But if you suspect you'll need higher speeds, faster feeds and greater production capacity in the near future it's wise to gear your thinking and purchasing accordingly.

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.



MODEL R HOBBER · HT THREAD MILLER · 7-A ROTARY HOBBERS · CRI-DAN THREADING MACHINES · MODEL 40 THREAD MILLER · SH SPLINE HOBBER · 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

"Sure, I'm Top Brass— and mighty proud of it, too!"

The Brass

The new doorknobs on the Pentagon are brass, and GIs who recall the frosty remarks of some high ranking officers about their use of the term will get many a chuckle out of the change.

The old hardware on the main entrances was cast iron but it was rusting away and the building managers were reported to have received complaints about broken fingernails from some of the personnel. Since a taut military organization can't handle paperwork properly or even stand a passable inspection, on or off duty, under such conditions, we think the change is all for the better.

But we never could see the objection to the word "brass" as applied to the higher military echelon by those of lower rank. The term not only has a ring of authority to it, there is even good authority for its use. It comes from "brass hat" and Webster tells us that this means "a general or staff officer; — from the ornamental gold braid on the cap. *Slang.*" So those who want to try to stop use of the term must first stop using brass all over themselves and leave it for the doorknobs.

Even so some other descriptive terms will come about. A little poke at pomp and circumstance is part of a citizen military establishment. Any soldier who laughs at himself as nothing but "government issue" along with the guns and rations is not going to stop there.

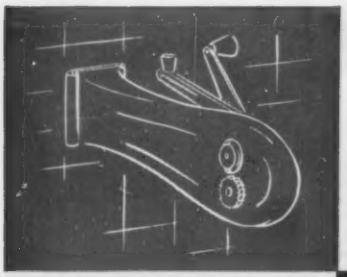
Further, if the present GIs indulge in the same unrestrained nomenclature we remember, ranking officers ought to be happy to settle quickly for just brass.

Editorial from the WALL STREET JOURNAL

BRASS *opens the door to the solution of countless problems in fabrication and use. And Bristol has an exceptional record of 104 years as a dependable supplier of top-quality strip, wire, and rod. In fact—*

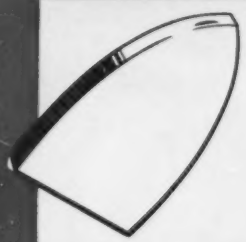
"Bristol-Fashion" means **Brass at its Best**

THE BRISTOL BRASS CORP., BRISTOL, CONN. OFFICES OR WAREHOUSES IN PRINCIPAL CITIES



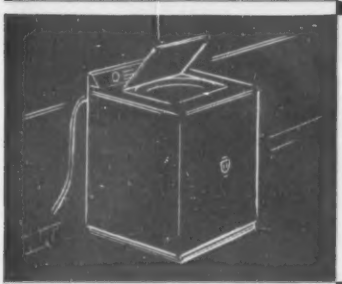
DETROIT BROACH TOOLS CAN OPENER WHEEL

The serrations on the gripper wheel of can openers are produced with Detroit Broach tooling. While taking a big bite out of production costs, broaching produces sharp teeth with consistent form that requires no additional machining.



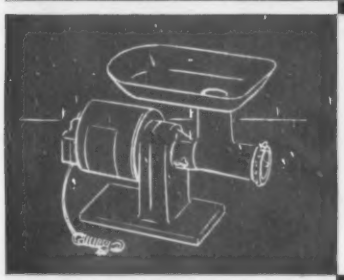
DETROIT BROACH TOOLS FLAT IRON SHOE

In one fast pass, Detroit Broach tooling machines the faces of these shoe castings sufficiently smooth and flat that only an additional buffing operation is required. On such castings of iron or aluminum, output is high and money is saved.



DETROIT BROACH TOOLS WASHER QUADRANT

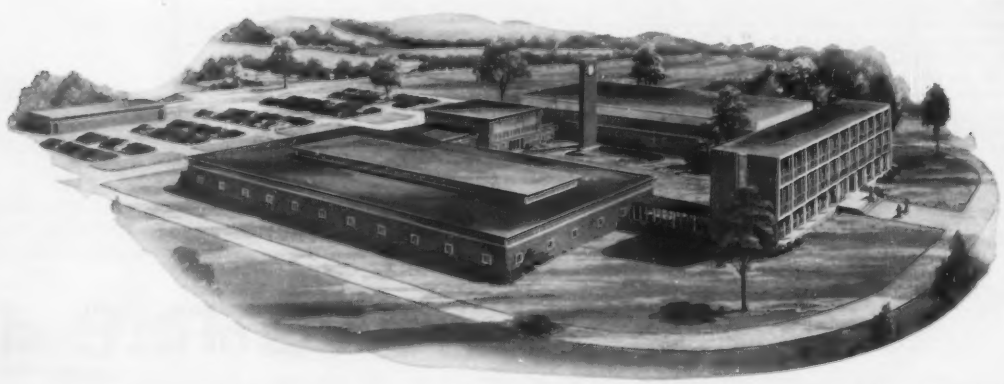
Detroit Broach tooling produces twelve involute teeth in washer quadrant castings with a 1/2" depth of cut, accuracy of the involute is easily held within .001". In addition to accuracy, broaching is washing the spots off previous production figures.



DETROIT BROACH TOOLS GRINDER BLADE

Producing the internal tooth form in meat grinder blades would be a slow task by any method other than broaching. But Detroit Broach tooling produces the entire form in one pass with a surface finish so smooth that no additional finishing is required.

This is a view of the new, ultra-modern Detroit Broach plant and offices located in Rochester, Michigan—just outside Detroit. Designed by Sture Frolen, eminent Swedish architect, it embodies many important advancements that contribute to employee morale and manufacturing efficiency. Another example of the unusual facilities of Detroit Broach Company.



Broaching Pioneers

IN THE APPLIANCE INDUSTRY

Thanks to the ingenuity of America's appliance industry, today's housewife has been elevated from the status of hand laborer to that of a skilled technician. In every phase of her daily housework, mechanical and electrical tools lighten her work and shorten her working hours.

To bring these worksavers within the reach of the *average* housewife has called for the application of the most economical production techniques. And that is why the appliance industry has long relied upon Detroit Broach tooling—to help them shave costs while maintaining a high level of quality. At the left are four examples.

in YOUR industry, too,

you will find countless examples of Detroit Broach tooling that is putting the squeeze on manufacturing costs. At the same time it consistently raises production output per man with automatic repetitive accuracy.

Part of the reason for the performance of Detroit Broach tooling is due to the fact that our entire efforts and facilities are keyed exclusively to this one machining technique. Another reason is our conviction that the conventional approach is not always the best approach . . . we point to some of broaching's great advancements as evidence.

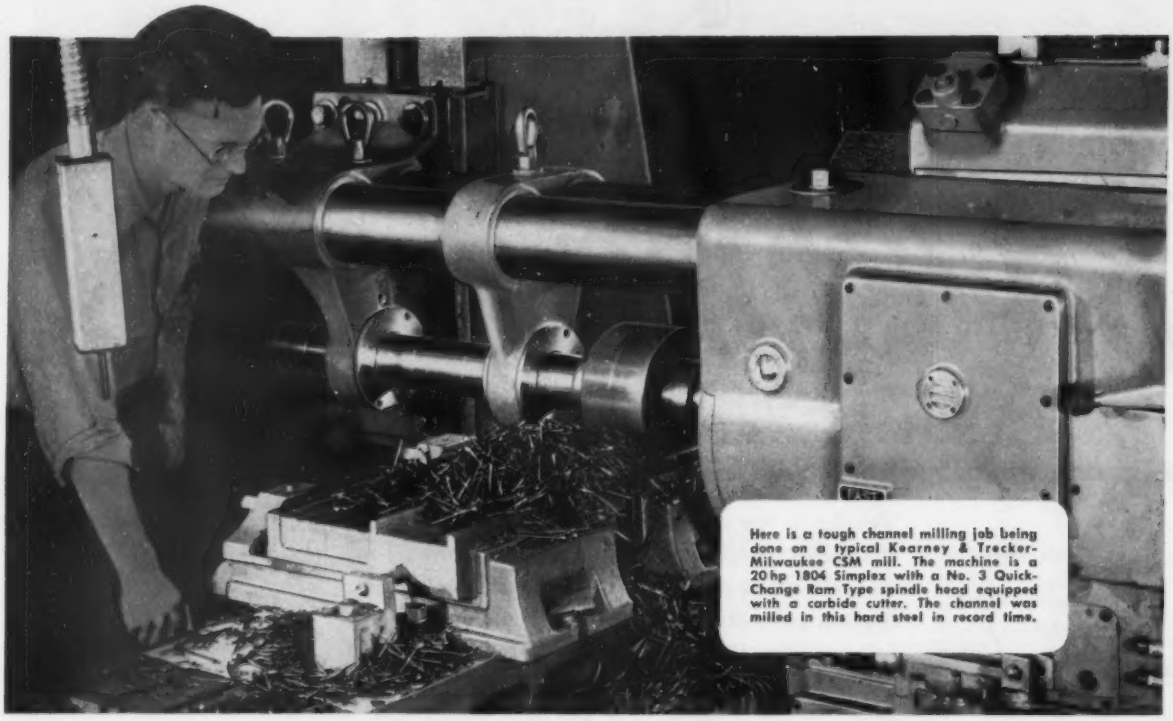
Why not investigate the all-round economies that these facilities and this thinking can achieve in your plant. There is a Detroit Broach representative in your locality who can give you all the answers. Drop us a line and we'll have him call at your convenience.

Detroit Broach COMPANY

ROCHESTER, MICHIGAN

OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Put your milling on a profitable production basis



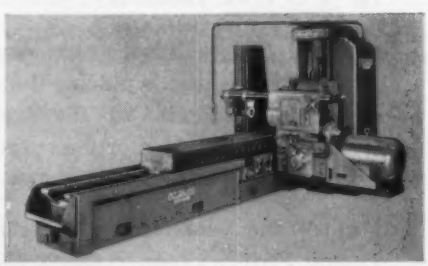
Here is a tough channel milling job being done on a typical Kearney & Trecker-Milwaukee CSM mill. The machine is a 20 hp 1804 Simplex with a No. 3 Quick-Change Ram Type spindle head equipped with a carbide cutter. The channel was milled in this hard steel in record time.

Choose a CSM BED TYPE production mill from over 400 available combinations!

FOR more efficient metalworking, investigate the most modern and useful line of bed-type milling machines ever designed. Custom-built from standard units, CSM machines are available in 10 to 50 hp, Simplex and Duplex models with a choice of quill type or ram type heads. Tables are available in four standard widths — 18, 24, 32 and 42″ — with travels from 4 to 12′. Rapid traverse rate is 150″ per min., and 32 feed rates range from ¼ to 60″ per min. You can choose from a wide range of attachments and accessories to meet your exact tooling needs.

Your Kearney & Trecker Special Machinery representative will be pleased to give you all the details . . . help analyze your machine tool requirements.

Capacity . . . Experience . . . Performance — In our just completed $5,200,000 expansion of our Special Machinery Division, we offer you (1) unmatched facilities, (2) experience based upon more than 50 years in the design and production of special machinery, and (3) performance, best recommended by our outstanding record of successfully solving many hundreds of unusual machining problems.



Here is a 50 hp CSM Simplex Milling Machine with a No. 5 Quick-Change Ram Type Head.

Our complete line of CSM milling machines is described and illustrated in detail in this big 20-page catalog. For your copy write to Kearney & Trecker Corp., Special Machinery Division, 6784 W. National Ave., Milwaukee 14, Wis.

KEARNEY & TRECKER CORP. • *Special Machinery Division*
MILWAUKEE 14, WIS., U. S. A.

NO, SIR! The Seal Won't Blow!

METALLIC-BACKED neoprene seals are used in this famous bearing—and they are engineered to *stay put.* They won't blow.

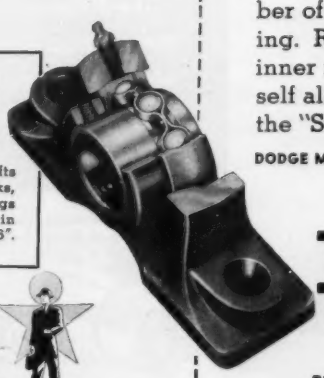
Your lubricant stays in; dust and dirt stay out; the result is years of trouble-free performance.

The "SC" Bearing is a service-proved member of the Dodge 30,000 hour line. Modern styling. Rugged one-piece cast-iron housing. Long inner race. Radial and thrust load capacity. Fully self aligning. *WRITE* for complete information on the "SC" Bearing in the Dodge catalog.

DODGE MANUFACTURING CORPORATION, 100 Union St., Mishawaka, Ind.

DODGE TYPE "SC" BALL BEARING PILLOW BLOCK

Precision built bearing for small shafts and moderate loads. Pillow blocks, flange bearings and hanger bearings available from distributors' stocks in shaft sizes ranging from 3/4" to 2-7/16".



CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained, he can give you valuable assistance on new, cost saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone book.

DODGE

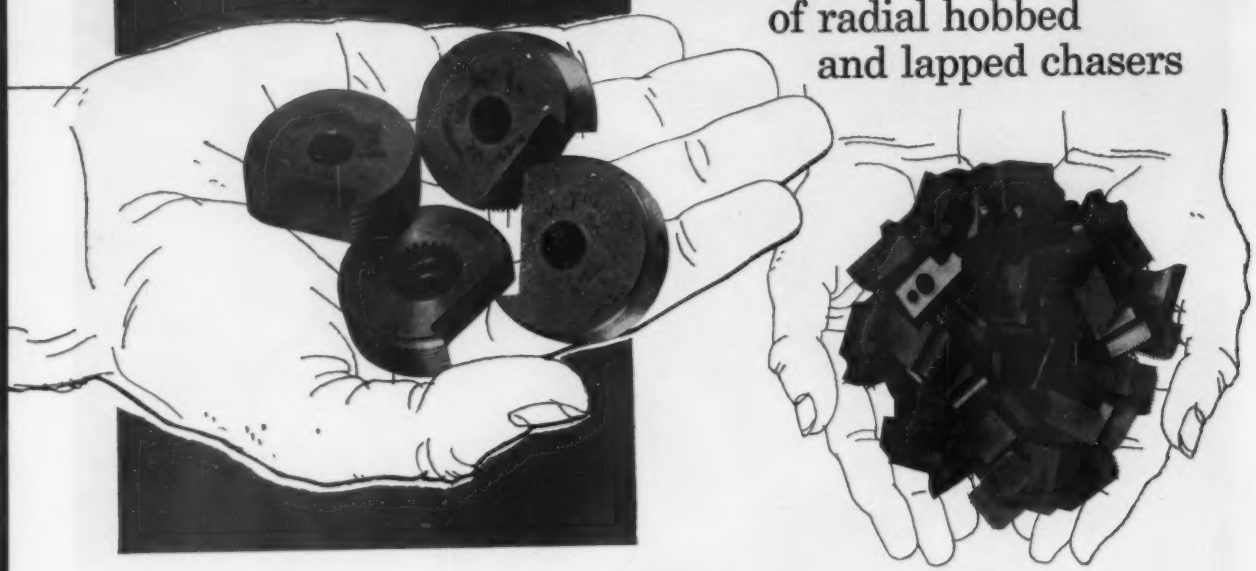
of Mishawaka, Ind.

FIRST IN POWER TRANSMISSION MACHINERY

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

1 SET of ground thread circular chasers cuts more threads... than 10 SETS of radial hobbed and lapped chasers



another reason why so many production shops standardize on

VERS-O-TOOL

with GROUND THREAD CIRCULAR CHASERS

With circular ground thread chasers, you grind 200 times and up—to a full 270° of their circumference; with radial type you average 4 grinds.

With circulars, you vary the grind with the right hook and clearance to suit any material; with radials your grind is fixed, usually limited to one material, one job.

With the circular chaser Vers-o-tool System you use the patented Micrometer gauge—every regrind is identical, insuring precise uniformity of threads. You avoid adjustments, scrap loss and save time—reduce your chaser costs 10 to 1 or better, over radial chasers.

Ask for Catalog DT-52

The NATIONAL ACME CO.

170 East 131st St. • Cleveland 8, Ohio.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

CHALLENGE TO OBSOLESCENCE

By the time you've used up two sets of circulars you will have saved enough to pay for the entire Vers-o-tool installation.

The difference in life and in performance between ground thread circular chasers and the old conventional type as proved in shop after shop enables us to make this guarantee.

24-hour deliveries on most standard stockable NC and NF chasers and blocks—also National taper pipe and dry seal.

Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, 3/8"—6 1/2".

Style DR Vers-o-tool (Revolving Type) 13 Sizes 1/8"—6 1/2"

Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, 1/4"—5/8".

Ground thread circular chasers and their holding blocks are interchangeable, die size for die size, among all styles of Vers-o-tool automatic heads.

FORGET OLD NOTIONS about engine lathes . . .

MEET THE MODERN..

- A LATHE TO SPARK YOUR FANCY
- A LATHE TO WIN YOUR LOYALTY
- A LATHE TO MEET YOUR NEED

BOYE & EMMES

LONG LIFE HEAVY DUTY ENGINE LATHE

SERIES BB

EIGHTEEN SPEEDS

The outstanding value which is built into all Boye & Emmes Long Life, Heavy Duty Engine Lathes is evident in the extra quality features discussed in this folder. Compare Boye & Emmes specifications and features. You will find shorter shafts, more rigidity, greater speed ranges, more compact design throughout. Put one to work in your production and watch it become the "preferred" turning tool among the men who judge by day-in day-out performance.

HEAVY DUTY LATHES SINCE 1895

THE STORY is told in detail in Boye & Emmes Bulletin No. BB531

WRITE FOR IT! . . . no charge . .

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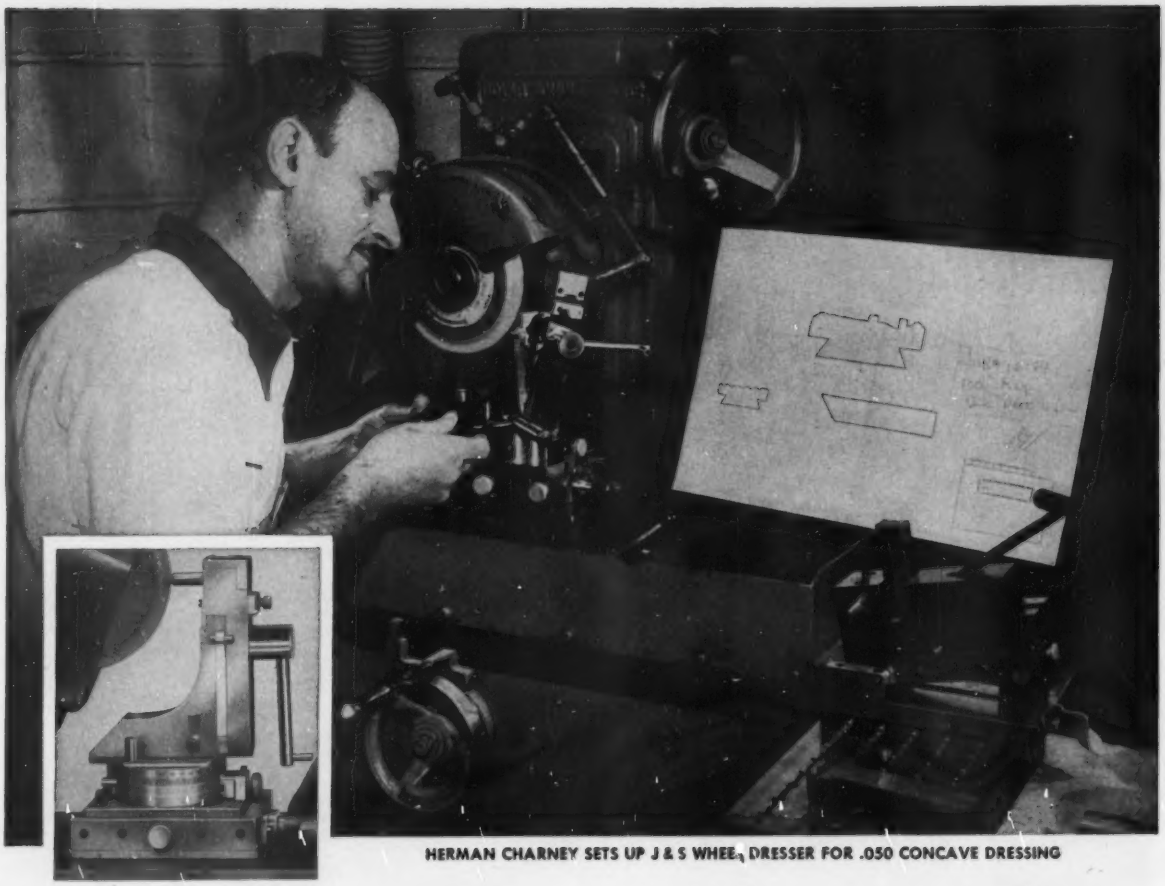
MACHINE TOOL CENTER of the WORLD



HERMAN CHARNEY SETS UP J & S WHEEL DRESSER FOR .050 CONCAVE DRESSING

Saves hours by setting angles in seconds, radii in minutes

A typical job made easier with a J & S "Fluidmotion" Wheel Dresser

Here's a wheel dressing job which calls for 13 angles, 4 radii, 7 flats. Ordinarily you might expect to spend from 5 to 30 minutes for each setting. With a J & S "Fluidmotion" Wheel Dresser, tool grinder Herman Charney made *all* 24 settings in just 21 minutes.

Time-saving Features

An unusual case? No — it's typical of the speed and ease of operating a J & S Wheel Dresser. Setting 2 angles with a "Fluidmotion" Dresser, for example, takes only 10 seconds. Setting a radius takes only 2-3 minutes.

Note just *how* easy it is to operate a J & S Wheel Dresser. All you need is a micrometer and a simple hex wrench. You can forget about gage blocks, height gages and master gage settings. No need to bother either with parallel bars, surface plates or dial indicators.

With the "Fluidmotion" Dresser, you can also dress two angles tangent to a radius in one continuous motion. After dressing the angles, the diamond automatically returns to center.

Accurate to 0.0001"

Accuracy? You can make concave and convex contours at a full 180 degrees with a guaranteed accuracy of 0.0001". J & S dressed forms, too, are always clean and precise. Angles and radii *flow* into each other, free of tool or chatter marks.

These are some of the benefits you get when you use a J & S "Fluidmotion" Wheel Dresser. A variety of models are available for dressing wheels up to 24" in diameter. Construction in all cases is of high-carbon, high-chrome steels.

Write for complete information today.

J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

646 W. MT. PLEASANT AVENUE, LIVINGSTON, NEW JERSEY

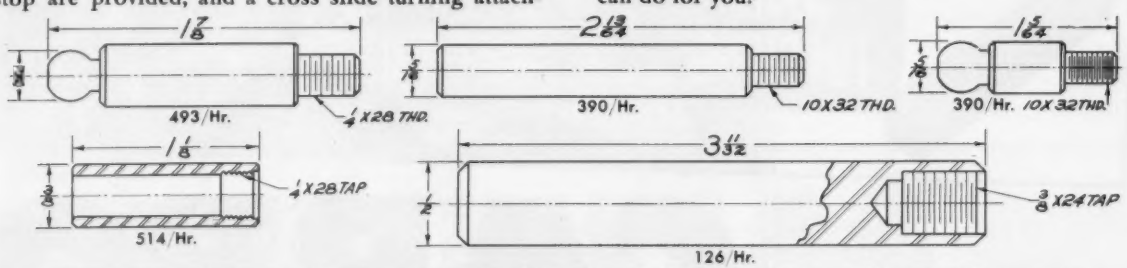
5 MINUTES' PRODUCTION

ON A CLEVELAND MODEL B

The photo above shows a 1-1/16" Cleveland Model B Single Spindle Automatic turning out a production part requiring forming, threading and cutting off at a rate of 493 pieces per hour.

You can't find a better, faster, more economical method of producing a wide range of turning and forming work involving multiple diameters, shoulders, tapers, etc., than with the Cleveland Model B Automatic. Simple tooling is mounted on a long milling slide capable of turning several diameters (or performing one end-working operation) and on two independent cross slides. An independent cut-off and swinging gage stop are provided, and a cross slide turning attachment is available for taper turning and turning work that cannot be formed. In addition, Model B's are readily adapted to important second operation work with magazine loading.

Cleveland Model B Automatics are made in 1-1/16" and 2½" standard models and in a 2½" Shaft Machine capable of working pieces 18" in length. Shown below are several jobs and the production rates obtained by a recent purchaser of a 1-1/16" Model B. If you are producing work requiring similar operations, get in touch with a Cleveland sales engineer. He'll give you complete information on what a Cleveland Model B can do for you.



THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
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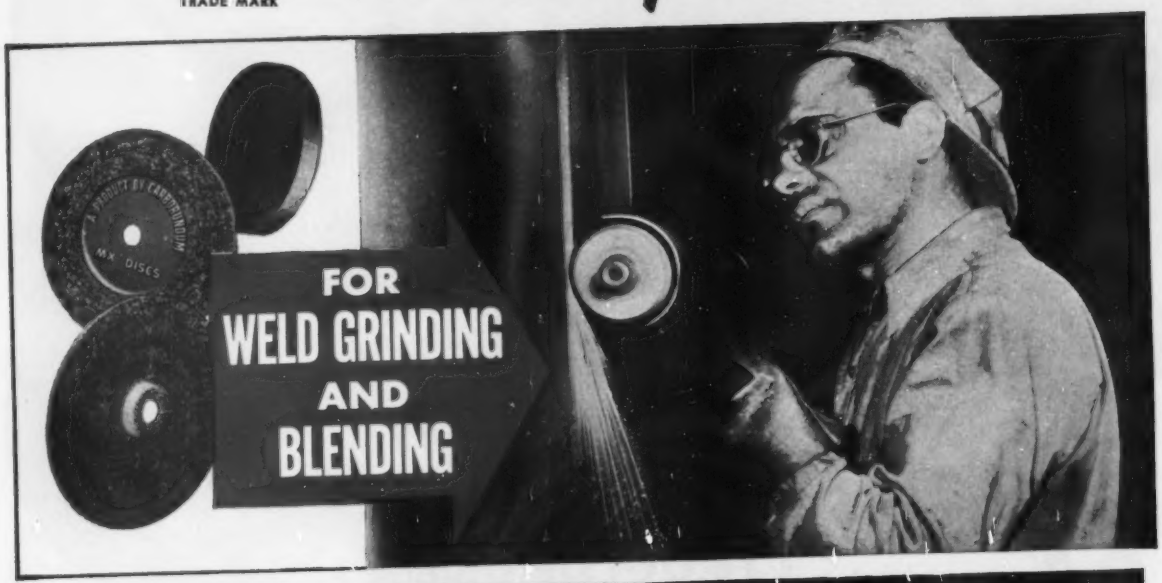
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Have you tried these MX abrasive products?

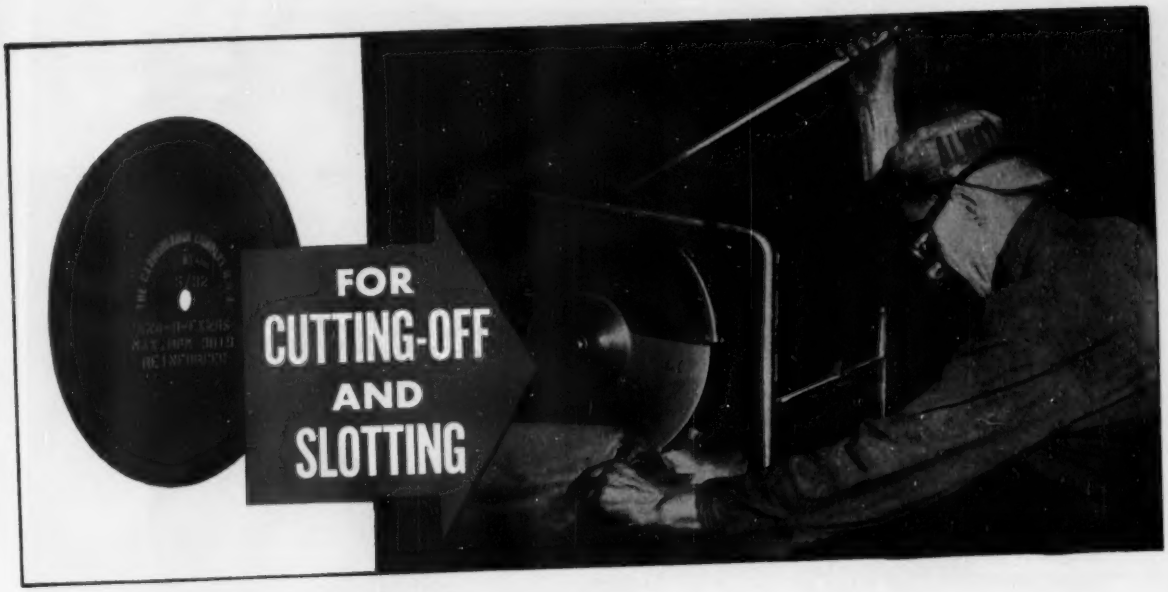
TRADE MARK



CARBO

TRADE

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.



Talk about versatility in grinding — MX products by CARBORUNDUM have it! For instance, one MX wheel reduces and blends rough stainless steel welds in one operation; another cleans out dainty decorative designs on sterling silver tableware; still another cuts through one inch black pipe in a matter of seconds. And these are but a few of the different kinds of work done by MX products every day!

MX abrasive products are in a class by themselves. They *finish* as they cut... they cut fast and clean... they resist loading — even on soft metals (they're tops for work on aluminum, for example), and alloys, or plastics, glass, and other non-metallics. They are *safe,* because of their high resistance to impact and heat shock. MX products work fast, wear slowly—remain usable right down to the arbor, shank or nut.

It's to your profit to find out what MX products can do for you — in any of these six forms: straight wheels, mounted wheels, cut-off wheels, discs, depressed center wheels, or sticks.

CALL YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for experienced counsel on the latest developments in the field. He carries complete stocks for prompt service. You'll find him listed under "Abrasives" in the yellow pages.

This "tell-all" booklet is FREE!

THE CARBORUNDUM COMPANY, Dept. AM-81-37
Niagara Falls, New York

YES! I'd like a copy of "MX Products" — Booklet No. 3.

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RUNDUM

MARK

the ONLY source for EVERY abrasive product you need

Mr. and Master Mechanics

This is Dad's special day . . . Family Open House at Lodge & Shipley . . . time when he can show off to his youngster. Perhaps making lathes doesn't seem as thrilling now to the boy as being a baseball star, but Son's impressed with the "wonderful" lathes . . . and Dad's beaming.

The youngster is like the thousands of Lodge & Shipley lathe users who for decades have been impressed by the results of craftsmanship like his Dad's. They translate the boy's words of wonder into more specific terms like "time savings and cost cutting." They see in the intricate Lodge & Shipley headstock, with its 599 precision parts, workmanship that won't make headlines . . . but will help in the struggle against ever-rising costs.

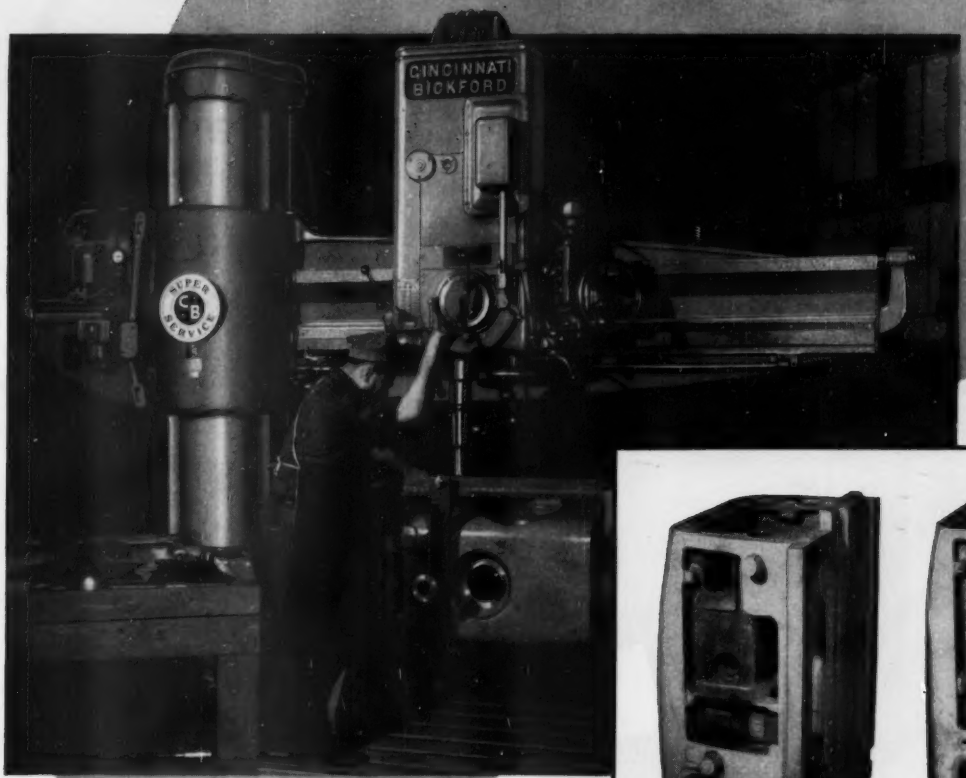
Why not let us send you a file of case histories and other information on more profitable production with Lodge & Shipley Lathes.

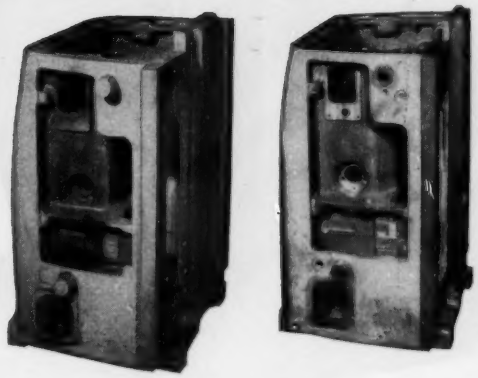
Just write The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Lodge & Shipley

. . . . your **LODGE**-*ical choice!*

Bickford accuracy





Milling Machine Knee

Photos courtesy of the George Gorton Machine Company, Racine, Michigan

. . . HELPS BUILD ACCURATE MACHINE TOOLS

To .0005″ accuracy, this performance in drilling, reaming and boring 100 holes from ½″ to 2½″ diameter to 3″ deep, to this tolerance, is typical of Cincinnati Super Service Radial Drills.

Here at the George Gorton Machine Company, manufacturers of machine tools, where accuracy is necessary, ten Cincinnati Bickford machines are in use.

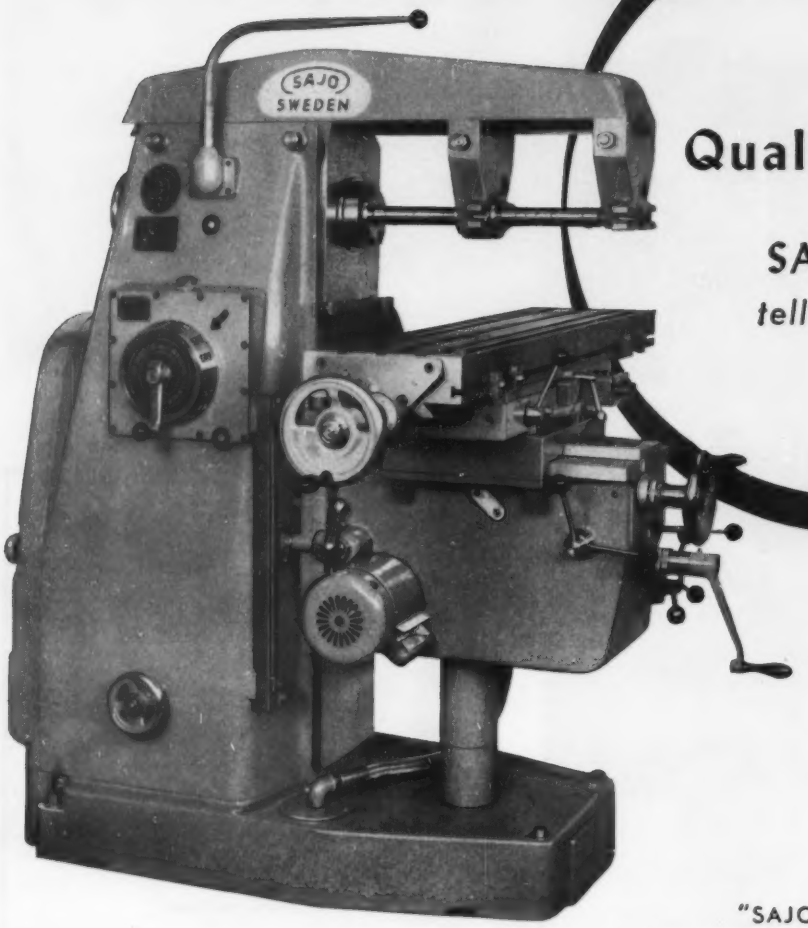
Write for Catalog R-29.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.



Quality pays off

SAJO *in operation tells its own story**

ASTE SHOW
Booth 1334

"SAJO" and "Quality" are synonymous. The high standards and painstaking Swedish craftsmanship on which the SAJO reputation has been established are faithfully maintained in all SAJO Milling Machines. They are built to assure the accuracy and dependability which mean profitable operation — and their cost is surprisingly low. Available in 3 models!

Model 54 (illustrated) a full No. 2 capacity ALL-GEARED Miller — Plain or Universal types — 7½ HP motor (5 HP optional) — 1½ HP table feed motor; #50 NMT spindle; 16 spindle speeds up to 1500 RPM; single lever speed and feed selectors with direct reading dials; single lever control for START-STOP-BRAKE; table power feed and POWER RAPID TRAVERSE in 3 directions. Model 53 Light Duty No. 2 ALL-GEARED Miller. Model 48 Light Duty No. 2 Utility Miller.

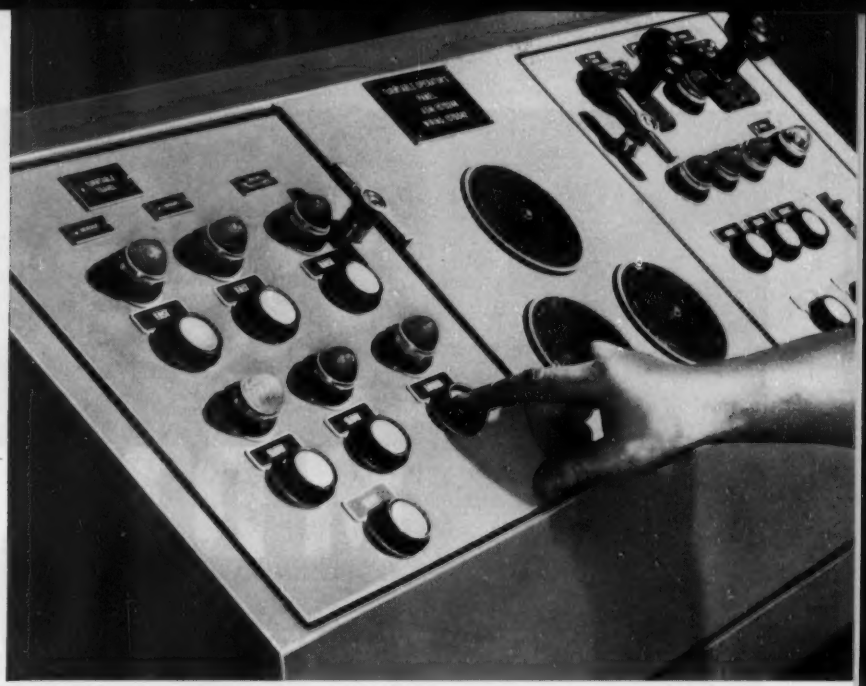
**Ask for references*

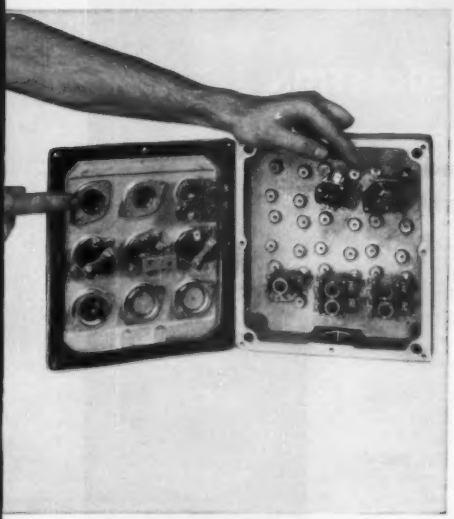
austin industrial corp.

76-F MAMARONECK AVE., WHITE PLAINS, N.Y.

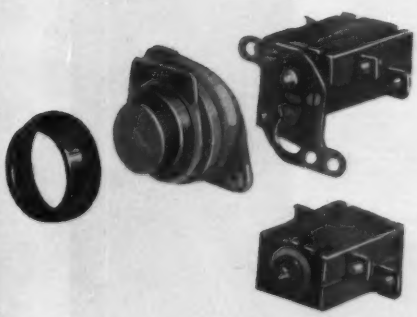
Look for the Austin Seal — your full guarantee of satisfaction.

INTRODUCING new all-angle indicating light with glass faceted lens for easy visibility.





BACK OR FRONT MOUNTING of lights or units for any installation requirement.



BUILDING BLOCK CONSTRUCTION. All push-button operators use one basic contact block.

New All-angle Indicating Light Added to G-E Oil-tight Line

All-angle indicating lights—full-voltage, transformer, resistor-types—are the newest addition to G.E.'s oil-tight line. Made of highly refractive glass, the lights remain clear and resist damage by acids or temperature changes.

SAVE 3 WAYS WITH COMPLETE LINE

For all your applications where oil or liquid is present, G-E units—push buttons, selector switches, indicating lights, accessories . . . .

1. SAVE SPACE. Small, compact size of all units permits neat panel installations. They enhance the appearance of modern machine tools.

New indicating lights are compact—yet protrude from panel for all-angle visibility.

Save stocking space, too. No need to stock special forms—simply make your own combinations from basic units.

2. SAVE MONEY. Reduce your inventory with these G-E units that have interchangeable color rings, separable operators, and one basic contact block. Assemble your own double-pole, double-throw and tandem units.

No need to buy whole operator to get a certain color push button. Simply use any one of five interchangeable color rings.

G-E units are designed to last longer. Self-a-line contacts distribute wear evenly over both contact surfaces. Actual load-life tests show 2:1 increase in life.

3. SAVE TIME. Remove cover and back-mounted lights and units stay in place to permit fast wiring. Back-mounting eliminates cabling extra wire to cover.

Wiring is quick; and special washer makes unit oil tight with only normal hand tightening.

The complete G-E line includes a variety of operators, enclosures, and a new pendent station for portable control.

SECTION C730-51
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.

Please send me Bulletin GEA-5779B which describes G-E oil-tight units and gives complete ordering and pricing information.

Name .....

Address .....

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GENERAL ELECTRIC

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For the Protection of Our Customers The Machinery Dealers National Association Has Unanimously Adopted the Following:

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We, as members of MDNA, pledge to:

1. Carry out the spirit and letter of all agreements and contracts in which we engage, in both buying and selling.
2. Represent our merchandise to the best of our ability as per—
   a—Serial Number
   b—Condition
   c—Specifications and accessories
3. Shall honor every option given a customer, both as to price and date.
4. Shall not cause a customer to inspect merchandise which we may not own unless the customer is fully informed of all circumstances concerning the owners' condition of sale.
5. Accept within 30 days from shipment, any merchandise sold with a guarantee, freight prepaid, for refund of the purchase price, if mechanically unsatisfactory.

Your Investment Is Protected When Conducting Business With An M.D.N.A. Member.

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West Coast Machinery Co.
1006 First Ave., South
Seattle, Wash.

MILWAUKEE CHAPTER

Milwaukee, Wis.

F. W. Burns Machinery Co.
1730 W. North Ave.
John S. Cannell, Machy.
719 N. 26th St.
Meyer Gronik Co.
135 W. Wells St.
A. G. Hansen Machinery Co.
404 E. Wisconsin Ave.
Walter W. Hohler, Jr.
4916 N. Santa Monica Blvd.
Industrial Machinery Co.
810 W. National Ave.
L. L. Richards Machinery Co.
2123 W. Clybourn St.

Minneapolis, Minn.

L. H. Harvey Machinery Co.
2300 E. 31st St.
Midwestern Machinery Co.
336 Midland Bank Bldg.

●

Gordon Engineering, Inc.
1882 E. Main St.
Madison 4, Wis.

NEW YORK-NEW ENGLAND CHAPTER

New York City

Aaron Machinery Co., Inc.
45 Crosby St.
All-State Machinery Corp.
185 Centre St.
Capitol Machinery Corp.
235 Centre St.
Graham Machine Tool, Inc.
231 Centre St.
Industrial Plants Corp.
90 West Broadway
Jayco Machine Co.
136 Liberty St.
Maxwell Machinery Corp.
1775 Broadway
Morey Machinery Co., Inc.
410 Broome St.
Triplex Machine Tool Corp.
75 West Street
Wiener Machinery Co.
237 Centre St.
Alex Zeeve & Co.
2617 Woolworth Bldg.
Zeisel Machinery Co.
208 Centre St.

Newark, N. J.

Garden State Machinery Corp.
59 Edison Place
Norman C. Glaubinger
1060 Broad St.
Hasco Machinery Co.
661 Frelinghuysen Ave.
Ralph Hochman & Co.
52 Edison Place
Johnson Machinery Co.
59 Edison Place
Williams Machinery Co.
990 Broad St.

Brooklyn, N. Y.

Kings County Machy. Exchange
408 Atlantic Ave.
Ornitz Equipment Corp.
220 Third Ave.
Parker Machine Co., Inc.
158 Pioneer St.
S & S Machinery Co.
140 53rd St.

Providence, R. I.

Hazard Brownell
550 Waterman St.
H. Leach Machinery Co.
387 Charles St.
Reynolds Machinery Co.
303 Eddy St.

New Haven, Conn.

Botwinik Brothers, Inc.
333 Welton St.
Nutmeg State Machy. Corp.
1041 State St.
Thomas Machinery Sales
111 Casey Beach Rd.

Long Island City, N. Y.

A & J Machinery Corp.
24-34 45th St.
Machine & Tool Co.
29-28 41st Ave.

Boston, Mass.

Joseph Beal & Co.
465 Atlantic Ave.
B. D. Brooks Co., Inc.
310 Atlantic Ave.

Bridgeport, Conn.

Austin D. Lucas & Co., Inc.
125 Lindley St.
J. L. Lucas & Son, Inc.

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Bennett Machinery Co.
375 Allwood Road
Clifton, N. J.
Botwinik Bros. of Mass., Inc.
2 Sherman St.
Worcester, Mass.
Currier Machine Sales
376 State St. (Box 292)
North Haven, Conn.
Hicks Machinery Co.
110 Albany St.
New Brunswick, N. J.
Machinery Bargains, Inc.
434 Midland Ave.
Garfield, N. J.
Wigglesworth Machine Tool Co.
199 Bent St.
Cambridge, Mass.

PHILADELPHIA CHAPTER

Philadelphia, Pa.

Bauer Machinery Co.
1114 Frankford Ave.
Commercial Equip. & Machy. Co.
1330 N. 5th St. Box 3458
Delta Equipment Co.
148 N. Third St.
Fitzpatrick & Walsh
2439 North 9th St.
Samuel T. Freeman & Co.
1808 Chestnut St.
Joseph Hyman & Sons
2600 E. Tioga St.
Interstate Machy. Co. Inc.
A and Venango
Kamis Engineering Co.
Third and Moore Sts.
Machine Tools Sales Co.
36 S. Delaware Ave.
Mickleburgh Machy. Co. Inc.
3130 Belgrade St.
O'Brien Machinery Co.
1545 N. Delaware Ave.
Republic Machinery Co.
134 N. 3rd St.
Elmer E. Stewart Jr.
1541 Land Title Bldg.
Herman L. Winterer
943 N. Front St.
Zakroff Machinery Co.
249 N. Third St.
Carney Machy & Equip. Co.
1321 Hanover Ave.
Allentown Pa.
Continental Machy & Equip Co.
Ostend & Ridgely Sts.
Baltimore 30 Md.
W. R. Graupner Inc.
17th & Mulberry Sts.
Harrisburg Penna.
Kinnear Machinery Co.
Keswick Ave. & Waverly Rd.
Glenside Pa.

PITTSBURGH CHAPTER

Pittsburgh, Pa.

Kruman Equipment Co.
129 1st Ave.
McBeth Machinery Co.
1109 Grant Bldg.

●

Billard Mach. & Tool Co.
Mansfield Pa.
Castle Machinery Co.
Box 310
New Castle Pa.

ST. LOUIS CHAPTER

St. Louis, Mo.

B. Heltzman & Sons Machy. Co.
1500 N. Broadway
Wm. C. Johnson & Sons Machy. Co.
1234 N. 12th Blvd.
Lefton Industrial Corp.
212 Victor St.
McDonald Machinery Co.
1531 N. Broadway
McLeod Machinery Co.
4426 Manchester Ave.
Municipal Tool & Machy. Co.
1526 N. Broadway

Dallas, Texas

Briggs Weaver Machy. Co.
5000 Hines Blvd.
Huster Machine Tool Co.
1109 Patterson Ave.
Lone Machine Tool Co.
2801 Elm Street

Indianapolis, Ind.

Hunt Machinery Co.
817 N. Grant Ave.
Indianapolis Mach. & Supply Co.
1959 S. Meridian St.
Winston Machinery Co.
326 West Ohio St.

●

Dixie Mill Supply Co., Inc.
901 Tchoupitoulas St.
New Orleans, La.
Fuchs Machy & Supply Co.
521 S. 15th St.
Omaha, Neb.
Hood Machinery Co.
Yorktown, Indiana
Machy. Sales & Eng. Co.
21 Nolan St.
Houston 3, Texas
Henry A. Webb & Co.
629 Ben St., P. O. Box 1987
Fort Worth, Texas

NEW YORK-ONTARIO CHAPTER

W. C. Cowden Machinery Co.
1207 W. Genesee St.
Syracuse, N. Y.
Electric Equipment Co.
63 Curlew St., Box 51
Rochester 1, N. Y.
Frontier Machinery Co.
17 Kenview Ave.
Buffalo 17, N. Y.
G & R Mach. & Equip. Co., Inc.
20 Superior St.
Buffalo, N. Y.
Miller Machy & Supply Co.
175 King St., East
Toronto, Ontario, Canada
Silver Brothers
7-11 Mary St.
Hamilton, Ontario, Canada
Surplus & Salvage Co., Inc.
620 W. 8th St.
Jamestown, N. Y.

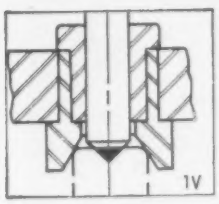
Executive Director
Mr. R. K. Vinson
DuPont Circle Bldg.
Washington, D. C.

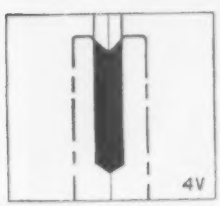
MDNA

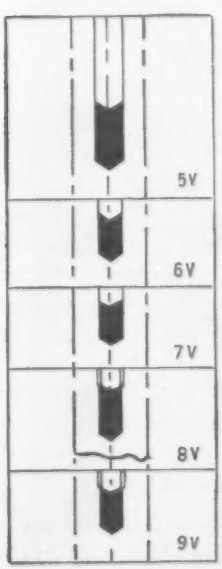
USED MACHINE TOOLS
MAKE *NEW*
MACHINE TOOLS

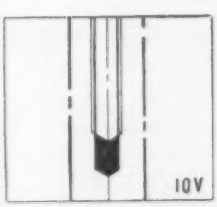
We Invite You To Add These Names to Your Mailing List As Repsonsible Buyers and Suppliers of Machine Tools

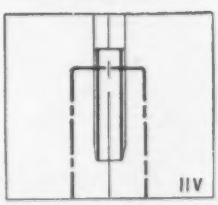
Combine Operations on a Kingsbury and turn

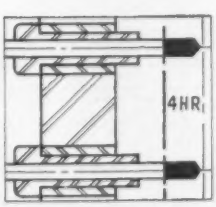


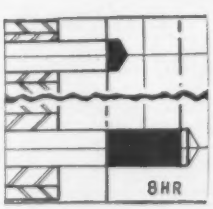












In one cycle through this Kingsbury, each of

This steel agitator shaft presented interesting problems: its shape, for one thing. It is 25⅝ inches long and ⅞-in. O.D. It has a keyway at each end, and an axial hole 4⅝ inches deep. Two ports enter this hole at 90°, and three horizontal holes are drilled through the shaft at 90° to these ports.

The Kingsbury has 11 units and an air-operated stamp mounted on the central column. Six units are mounted on the base; 12 work-holding fixtures are mounted on the 60-in. index table. Each fixture presents its work to cutting tools at 11 stations. One operator loads and unloads.

Axial Hole: To speed production, this hole is completed in 9 steps. Customer allowed these steps to vary from a start of .272 dia. to .250 dia. — a great help!

Unit IV: .343 at 45° spot for countersink. Sliding drill bushing carrier is piloted to top of work for concentric start of hole.

Drilling Units: 4V thru 10V complete the hole to a depth of 4⅝ inches.

Unit 11V .3125-24 taps hole ¾-in. deep.

out many parts per hour at low cost per part

You can combine your drilling, c'boring, reaming, tapping, light milling, recessing, spotfacing or threading operations — and reduce your costs.

Your part can be of any metal or material that can be machined economically. It must be of a size and weight which can be machined within the limits of 5 HP units and be handled efficiently by your operator. You must want a lot of parts per man-hour, because you'll get high production.

You'll get uniform accuracy. Your scrap loss will be reduced to a minimum. You'll save floor space. You'll eliminate re-handling. In fact, you'll be very happy about the whole thing!

Now, a word about the costs quoted in this advertisement. These costs amortize the entire Kingsbury investment over 6000 hours. This is a fraction of its useful life! They include the cost of the man and machine, but no power or overhead.

They assume unit cost of the man to be:

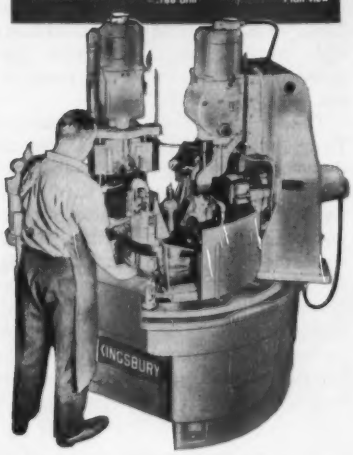
$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross X 80\% efficiency}}$$

They assume unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. at 80\% efficiency}}$$

Each Kingsbury machine is custom-built to do a specific group of jobs — and is given a trial run for your approval of the machined part before delivery. Are you really interested? If so, we'd like to see you.

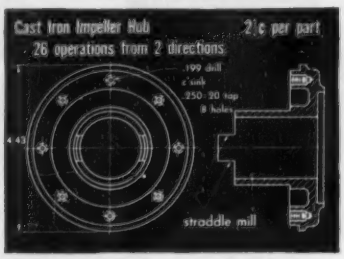
Kingsbury Machine Tool Corp.
103 Laurel St., Keene, N. H.



Steel Transmission Sleeve

350 parts per hour gross—1-4/10¢ each

Note plan view drawing — it shows the angles. Four work fixtures are located on a 20-in. index turret. All work is performed at three stations. Two horizontal and two vertical drilling units are mounted on the 60-in. base. One vertical drilling unit has a milling attachment with side adjustment to compensate for cutter wear. Work fixtures are unclamped automatically at the unloading station.

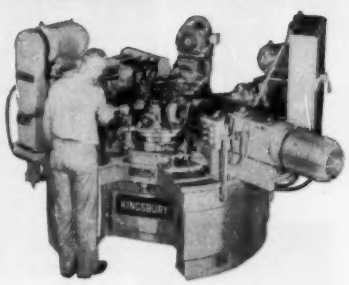


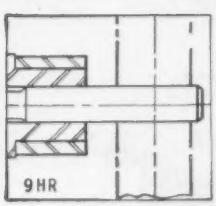
Cast Iron Impeller Hub

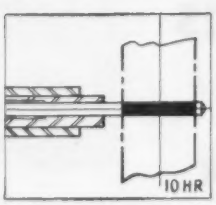
204 parts per hour—2½¢ each

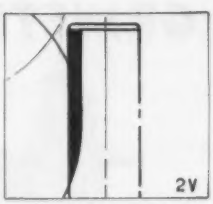
In this Kingsbury the units are located on the 80-inch base, and the work fixtures on a 26-in. turret. There are 8 stations.

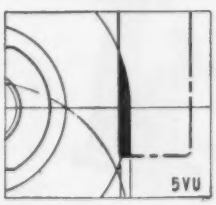
The machine performs 26 operations. Eight holes are drilled, c'sunk and tapped. But the milling operation is the most interesting. A milling unit is attached to a drilling unit equipped with a 7-in. stroke attachment. Cutters feed from right to left through the work, straddling the material.











12 parts receives 17 operations from 4 directions

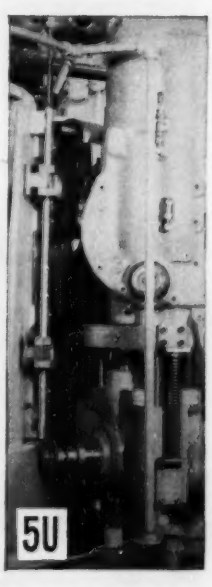
Horizontal Holes: Drills are located accurately by sliding tool guide bushing carriers piloted to each work fixture.

Unit 4H (right) has a 2-spindle auxiliary head — drills two .156 holes thru into axial hole on center line of keyway. *Unit 8H* (right) operates 2 spindles — drills .156 and .359 through shaft. *Unit 9H* (right) reams the .359 hole to .378/.377 diameter. *Unit 10H* (right) .125 drills through.

Keyways: At top of shaft, .156 wide keyway is rough- and finish-milled by units at 2V and 3V. At bottom of shaft keyway is milled .065 wide by *Unit 5U* (under), as shown in photograph at right. All milling units can be adjusted to maintain accuracy.

* * *

At Station 12 (where operator loads and unloads the machine) an air-operated identification stamp works on top end of the shaft just prior to the unclamping of the work-holding fixture.



Keep Your on the OLIVER Line — Cost Cutting Production Boosting MACHINE TOOLS

OLIVER DRILL POINTERS

Properly machine ground drills give better performance. OLIVER Drill Pointers, with each lip doing equal work, give balanced cuts—more accuracy—more perfect holes—more efficiency—longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to 1/2".

No. 510. For Drills 1/4" to 3"—2-3-4 flute.

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and lapping operations.

Available in 5 Models.

Bench Model S-1 (Illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

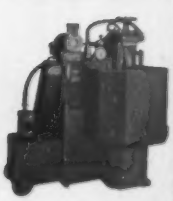
OLIVER ACE UNIVERSAL TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten-Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" —also, slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE TOOL BIT GRINDER



Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1 1/2" wide x 1 1/4" high from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten-Carbide and high speed tools—offers increased production, lower tool costs and savings in man-hours. Extremely fine finish assured.

Write Today for Complete Information

OLIVER INSTRUMENT CO.

1414 E. MAUMEE • ADRIAN, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Will They Talk?

As an American living in Britain, I have had to put up with a lot of ribbing—not all of it good-natured—about the myth of American superiority in modern machines which has been so completely exploded by publication of your recent machine-tool inventory.

That kind of information is, of course, tremendously valuable to both machine makers and users, but it does make us look a bit silly after all that has been said about our modern equipment.

Why not take a similar inventory of machine tools in this country? If the British knew how old some of their stuff is, perhaps they would stop picking on me, and it would sure give their industry a shot in the arm.

Henry Langstaff
London, England

Have you any idea of what such an inventory costs? It also involves a willingness to cooperate in providing what in Britain may be considered as private business on the part of the companies concerned.—Ed.

I Don' Wann'em

I should very much like to meet one of that famous "public" who keeps "demanding" things that manufacturers are then "forced" to supply. You say in your editorial (*AM*—Dec 7 '53, p 179) that if customers drool over plastic bodies, that is what Detroit will build. Now, I don't say plastic bodies are not good, but I sure never drooled over one.

The truth of the matter is that Detroit dreamed up a plastic body because they could make it for less and sell it for more. In a few years I'll have to buy a plastic body whether I want it or not. It's the same with most of the "revolutionary new developments." They're just slick tricks to make us pay more for our cars.

Take power seats, for example. They may be alright for a few fat dowagers who are too lazy to reach down and pull a lever, then hitch themselves forward or back, but I've never changed the position of my seat since the day I bought the car. If I lend my car to a long-legged friend and he wants to change the position, that's OK, but I can't see paying about a hundred bucks for a $25 item that I'll probably never use and that would probably be stuck

GRINETICS

BY D G SMITH

COLD-ROLLED

AFTERBURNER

CIRCUIT BREAKER

PRIME COAT

Republication rights reserved

There are lots of ways to

PIERCE METALS

...But here's

Precision Multiple Piercing at Lower Cost

DANLY HYDRAULIC METALWORKING EQUIPMENT

Pierce metal faster, with greater accuracy and at less cost. In a single setup for multiple piercing . . . or riveting, punch extruding or trimming . . . you can reduce costly handling by combining operations into a single setup. Danly Hydraulic Metalworking Equipment is engineered to meet your specific needs. Exclusive all-hydraulic action permits smooth operation, minimizes break-through shock, automatically strips each station and simplifies fixturing. Find out more about high production multiple hole piercing in a single setup—write today for special Danly Hydraulic Metalworking Equipment Bulletin.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois

One setup pierces seven irregular holes and trims this car door inner window frame.

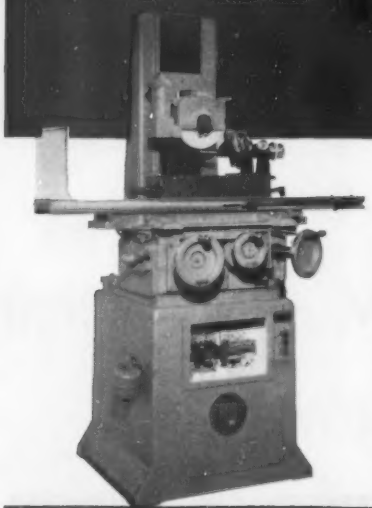
40 holes are pierced simultaneously in this automotive frame member on a Danly machine.

Irregular holes are pierced fast and accurately in this stainless steel jet engine part.

REID

SURFACE GRINDERS

have built-in accuracy for top performance in your toolroom



Every part in a Reid is designed and engineered to provide the extreme accuracy that toolmakers require for dependable results on fine tooling. Each feature which contributes to more precise work is rigidly tested, under acutal shop conditions, to determine its *right* to be part of a Reid Grinder. Not until the value of each individual feature is proved — in terms of top performance — is it presented to industry. A Reid Surface Grinder will prove a sound investment in quality production for *your* toolroom.

Better Surface Finish

. . . with the motorized spindle turning on pre-loaded bearings to eliminate wheel chatter, and the work table running smoothly on hand-scraped ways, ground pieces have a visibly finer surface finish.

Easier Operation

. . . finger-tip level controls eliminate stretching and bending, lessen operator fatigue. And, the electrical controls are fully visible, yet protected behind a transparent shatter-proof panel.

Rugged Design

. . . all mechanical units built around rugged one-piece column casting to insure permanent alignment of cross-slide saddleways and vertical headways. Column is mounted on heavy cast iron base for maximum rigidity and freedom from vibration.

Capacity-

6" x 18" x 17¼" from center of spindle to worktable. Table speed (Model 618V) 12 to 35 feet per minute.

PLAN FOR REPLACEMENT!

Get full details on Reid Grinders with built-in accuracy for better performance — please request Bulletin 618-1

Reid Brothers Company, Inc.

BEVERLY, MASSACHUSETTS

or broken if I did try to use it.

It's the same with this stupid power race. A handful of people, perhaps in the great Southwest where roads are long and straight, might be able to use 200 hp or more, but the millions of guys who do 90% of their driving in and around cities can't use more than a fraction of it. And, of course, with all that power, you can't stop or steer safely, so you have to have your power brakes and power steering. It's just over-mechanization, with one thing leading to another. I don't want these things —neither do millions of other guys —but when I'm ready to buy my next car, I'll bet I can't find anything less than 200 hp and enough mechanical and electrical gadgets to keep a staff of repair men happy for the rest of their lives.

Don't tell me the public wants these things. The public has them forced on it and is told it likes them. And after a while, the public begins to believe it. I could say a lot more about the chrome garbage and such stuff that I have to pay for, but you couldn't print it.

Don't think I am against progress. Anything that will improve the safety, efficiency, economy, and reliability of my car, I am willing and eager to have, and to pay for, but I hate to have to buy a lot of stuff I don't want, just because some designer dreamed it up and it gives an excuse for increasing the price.

H R V Crossthwaite
New York City

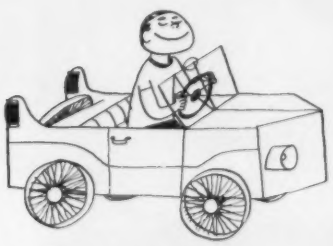
Old Oil

In your article on reclaimed oil (*AM* —Dec 7 '53, p 127) you indicate that Auto-Lite keeps using the same oil all the time, merely filtering it to remove the abrasive and metal particles. This does not seem right. Surely, after a certain length of time, the nature must go out of the oil and it will lose its lubricating ability. If this were not true, why do car manufacturers recommend changing oil every so often, and even suggest flushing out the crankcase to remove traces of spent oil that would contaminate the fresh?

Henry Browning
Buffalo

Research shows that oil never loses

its oiliness; it merely becomes dirty and contaminated with carbon and other foreign matter. When this is removed, the oil is as good as new, or even better. In the case of automobile oil, certain acids are also formed, as are products of oxidation. It is these acids that are particularly harmful and should be flushed out. It is cheaper to throw away used oil than to attempt to reclaim it in small quantities, although, from a lubricating standpoint, reclaimed oil may actually be better than fresh oil.—Ed.



Kiddie Cadillac

I was very pleased to see that at least one machine-tool builder is waking up to the realization that machine tools are meant to do a job—not just to look impressive (*AM*—Dec 21 '53, p 109). In my opinion, Taft-Peirce has always been a straight-thinking outfit, and I hope other builders will follow its lead.

The fully automated, electronically controlled, million-dollar, untouched-by-human-hands, super-duper, atomic-age monstrosities may be wonderful for producing millions of identical pieces, but the same kind of thinking should not be applied to standard machine tools.

There has been quite a bit of criticism of foreign machine tools on the grounds that they were too light. American machines can be similarly criticized as being too heavy. To put it in simple terms, a 1-ton hoist will lift 1 ton all day and every day, and will last indefinitely. The European respects that limitation and doesn't try to lift 2 tons with it. The American, on the other hand, tries to make it lift 2 tons all the time. So the manufacturer, knowing this, builds it strong enough to handle 3 tons, and comes up with something unnecessarily heavy, elaborate, and costly.

Let's keep simple machines simple. By all means retain all the accuracy and power needed for the type of work to do done, but keep the frills away. There's no sense in putting a Cadillac engine in a kiddie car.

Henry S Morgan
Philadelphia

for Special Service on Carbide "Specials"

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When your production machining problem dictates the use of special carbide tooling, your nearby Gorham Field Engineer can give you the right answers fast! He's an expert in the design and application of special cutting tools . . . and he provides a complete engineering service to determine your exact requirements.

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Yes, your nearby Gorham Field Engineer is a helpful man to have around! If you haven't yet met him, write for his name, or send details of your problem direct, and we'll have him get in touch with you promptly.

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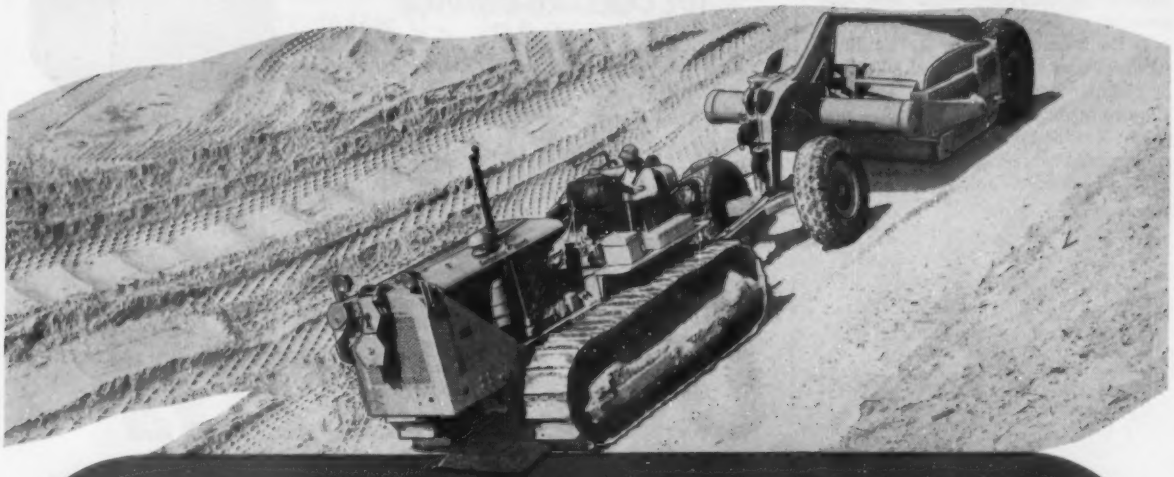
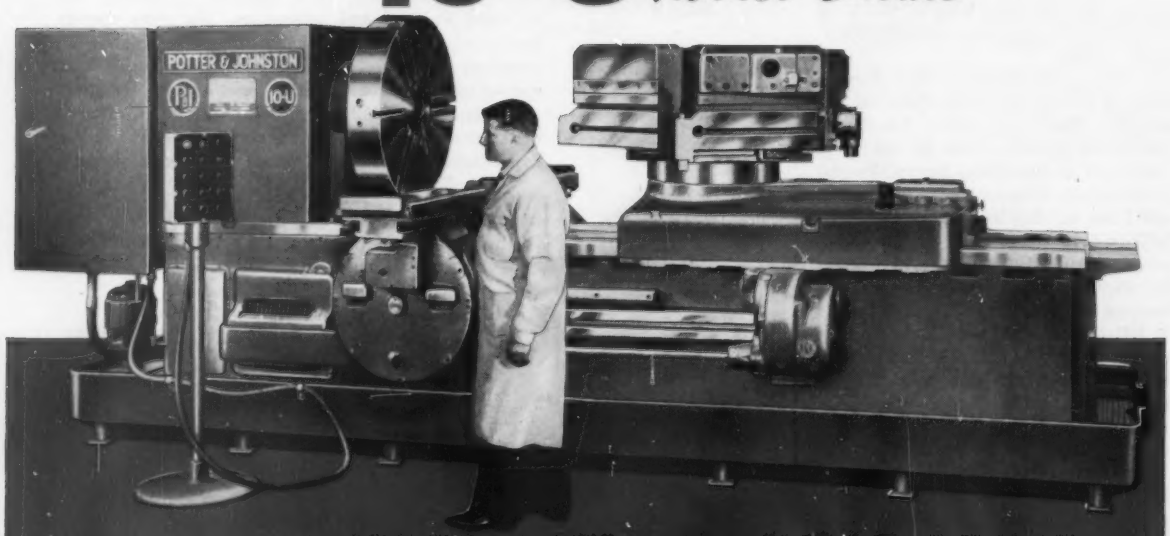


CATERPILLAR . . .

AND THE **POTTER & JOHNSTON**

10-U AUTOMATIC *Turret Lathe*

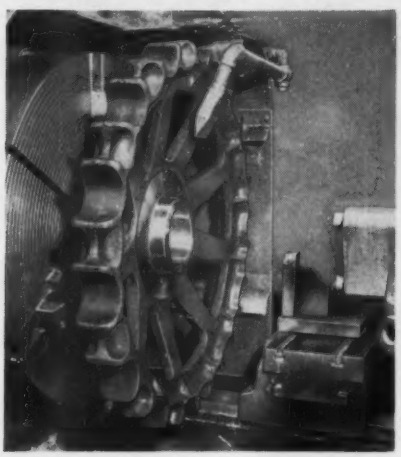


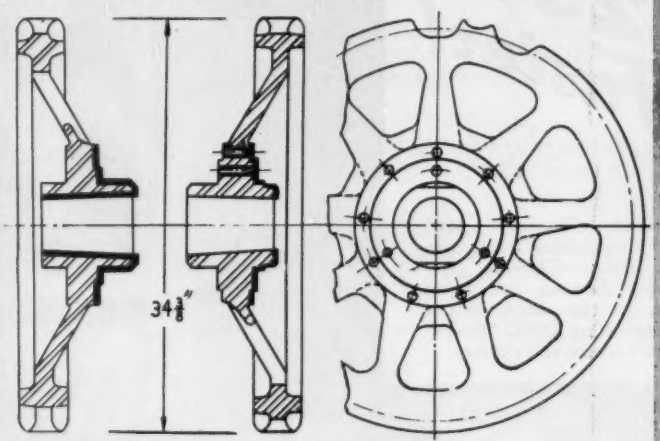
Famous as GIANT PRODUCERS that STAY ON THE JOB

they OUTWORK all the rest

For big tough turning work that must be handled economically, it was logical that Caterpillar Tractor Co. of Peoria, Illinois looked to Potter & Johnston for the most versatile machine and method to do the job. In this case, it was to machine sprockets — 34⅜" diameter cast steel track drivers with a maximum hub hardness of Shore 45.

HERE ARE THE RESULTS !!





FIRST OPERATION — SECOND OPERATION

HEAVY LINES INDICATE MACHINED SURFACES

FLOOR-TO-FLOOR TIME: 21.82 minutes per piece for complete finishing.

FIRST OPERATION: Turn taper bore with single point slide tool, turn face and chamfer inside sprocket hub.

SECOND OPERATION: Turn face and chamfer the outside hub. Drill nine .316" diameter holes equally spaced, and drill three, 23/64" diameter holes reamed to a tolerance of .001".

It takes full power, real productive capacity, and stamina to machine these track sprockets with high precision and low production costs, day-in and day-out. In this job, extra benefits from ingenious P & J Tooling were realized. As part of the second fully automatic operation, all twelve holes were drilled by using a self-driven Multiple Spindle Drill Head.

To turn out your hard-to-machine work faster and better — turn to the Potter & Johnston line of Automatic Turret Lathes — five basic machines feature fully automatic operation — from the 3-U Speed-Flex with a 9½" diameter swing over the cross slides to the Model 10-U AUTOMATIC with its 49" diameter swing over the base ways. For Model 10-U information ask for Bulletin No. 146 . . . for information on other models, call your nearest Pratt & Whitney Branch Office. An experienced P & J Tooling Engineer will study your piece drawings and furnish an accurate written estimate of expected piece production, plus a recommendation for the best combination of tooling and operational sequence. There is no obligation for this technical service.

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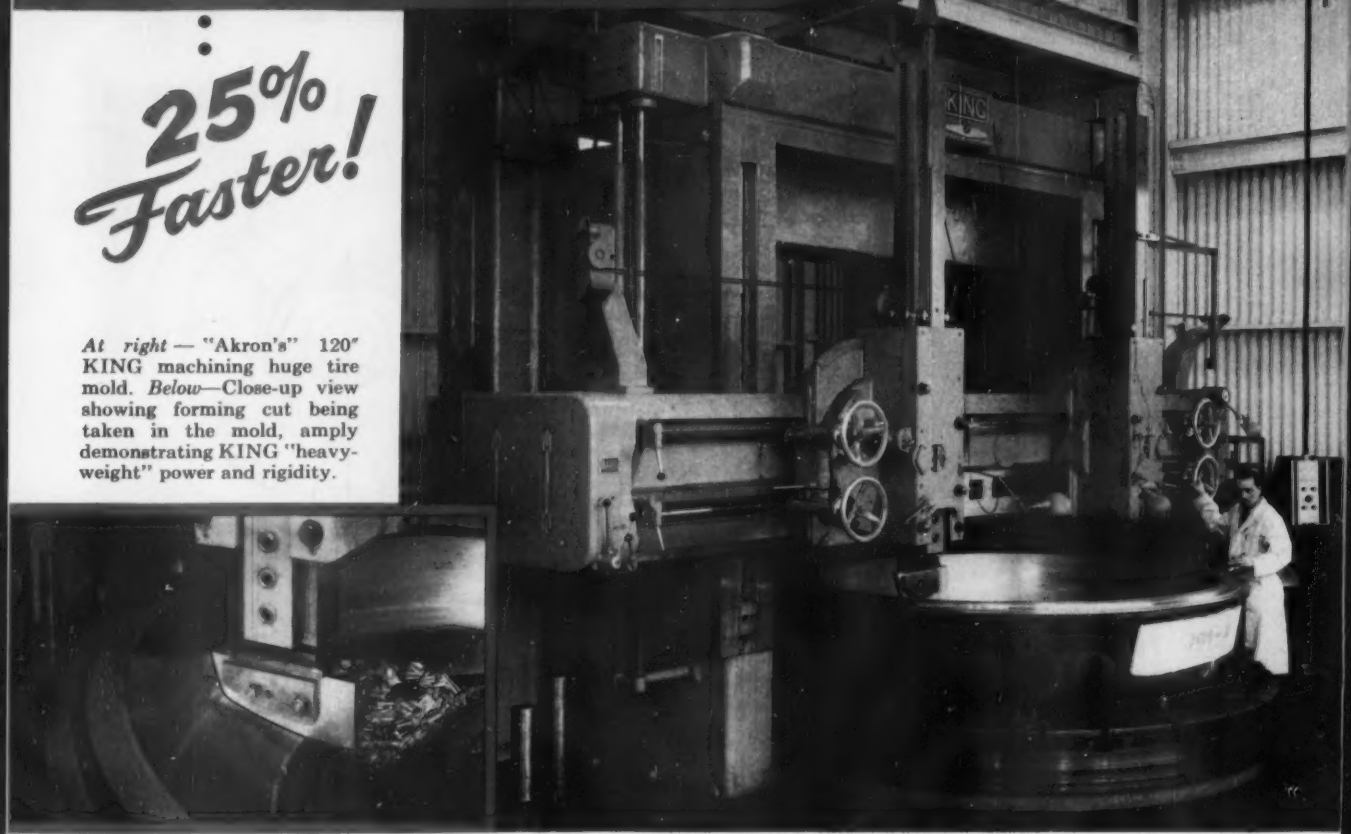
at THE AKRON STANDARD MOLD COMPANY

Machines "KING SIZE" Tire Molds

25% Faster!



At right — "Akron's" 120" KING machining huge tire mold. *Below*—Close-up view showing forming cut being taken in the mold, amply demonstrating KING "heavy-weight" power and rigidity.

The Akron Standard Mold Company of Akron, Ohio, a KING® Vertical Boring & Turning Machine customer of long standing, recently purchased the 120" KING shown above for manufacturing giant-size tire molds. The mold being machined is size 30.00 x 33, the largest size mold this company has made to date—so large, in fact, that the forming tool had to be made in three separate pieces in order to complete the contour.

Mr. W. P. Voth, President of The Akron Standard Mold Company, reports this new KING "amply fulfills our requirements . . . and turns out work even faster than we anticipated." Mr. Voth estimates that this new KING has increased production on large size molds by 25%.

Here is more on-the-job evidence of typical KING performance . . . the kind of evidence that explains why KING today, as in the past, is industry's logical first choice for fast, accurate, profitable production. KING Machines are made in 10 sizes, 30" to 144", in a wide variety of head combinations. See your KING Distributor, or write to us direct, for complete specifications and illustrated description of construction features.

American Steel Foundries

KING MACHINE TOOL DIVISION

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SPOT NEWS of Metalworking

- **Automotive industry spent $4177 per production worker** in improvement and expansion of facilities in 1953, Automobile Manufacturers Association reports. One auto firm spent $2.5 billion since 1945: another spent $1.6 billion.

- **Italian firm is supplying machinery for an American steel tube plant** to be built by Barium Corp at Phoenixville, Penna. Innocenti Co of Milan will supply more than 1000 tons of complex machinery and equipment—the first time in history that an Italian firm has sold capital equipment for a US steel plant.

- **Titanium output of 600,000-700,000 lb per month by June 1954** is predicted by the Aircraft Production Resources Agency. Titanium producers today can deliver about 300,000 lb of titanium mill products per month, says APRA.

GM's $1 billion expansion program will consist of new projects, hardly any of which have gotten to the tool-ordering stage. Large expenditures will be made for machine tools, presses, etc, to enlarge such facilities as Chevrolet's V-8 engine plant. For further machine tool news, please turn to page 111.

- **Right of a manufacturer to discharge an employee as a poor security risk has been upheld** by the regional National Labor Relations Board in Cleveland. Wellman Bronze & Aluminum Co let out a shop chairman of an AFL union who refused to say to the Ohio Un-American Activities Commission whether he was a communist. Union had filed charges that the company had interfered with an employee in exercising his rights.

- **Reports have it that 350,000 tons of sheet steel,** most of which came from conversion deals or from foreign sources, still are to be chewed up by automobile companies before steel purchases at Detroit get back to normal. Owners of this steel are said to be using it for the easy-to-make and hidden car parts.

- **Settlement on a five-cent-per-hour package basis was made recently** in a midwest city by one company in dealing with its union. Union demand had been for 15 cents (including fringe benefits). Observers are hailing this agreement as indicative of a more realistic attitude by union agents toward what manufacturers can do under today's conditions.

Highest Ordnance production since the outbreak of Korea was coupled with a steady reduction in unit costs of Ordnance equipment in 1953. Example: average cost of a ton of ammunition in 1951 was $1526, in 1952 $1308, in 1953 $1272. Production of artillery ammunition in 1952 was 52-million rounds, in 1953 87-million rounds. In 1952, 3-billion rounds of small ammunition were produced, in 1953 4 billion.

- **Hudson Motor Car Co sustained a net loss of $6,465,197** for the first nine months of 1953, after having been credited with a $6,770,034 federal income tax carryback. A major part of the loss can be blamed on the slow-selling Jet car.

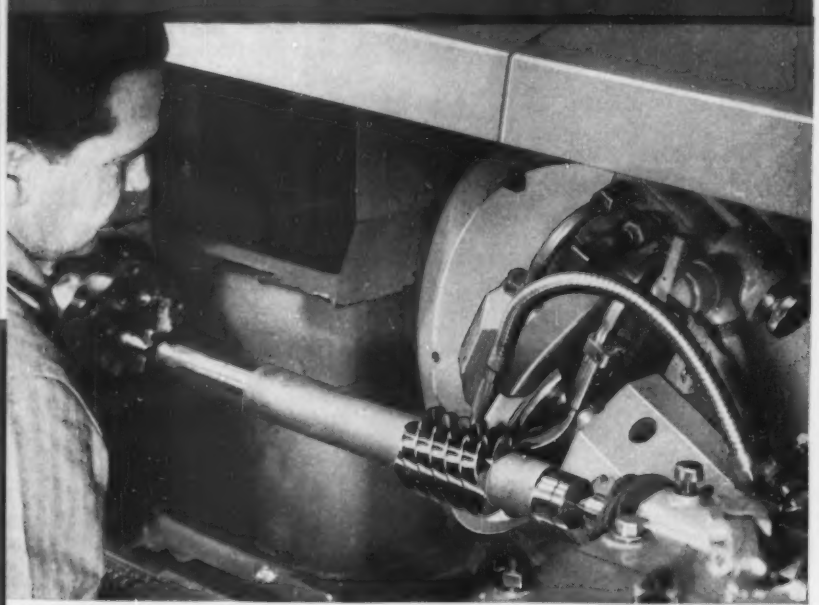
- **Russia may lend Finland $12-20 million gold to buy US machine tools,** with the loan to be repaid with Finnish exports to Soviet countries. But negotiations are bogged down and the US is said to be making a counter-offer of a loan of German marks through the World Bank for purchase of machinery from West Germany.

- **Production workers are becoming salesmen for the free enterprise system** at Thompson Products, Cleveland, where company personnel men have taught more than 300 volunteers how to speak before nationality groups, Kiwanis, K of C, Masonic lodges and other social and civic groups on the American economic system vs communism and socialism.

Grinding 5-Start Worm with 4" Lead

STANDARD STYLE 36

EX-CELL-O *Precision* THREAD GRINDER



In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.

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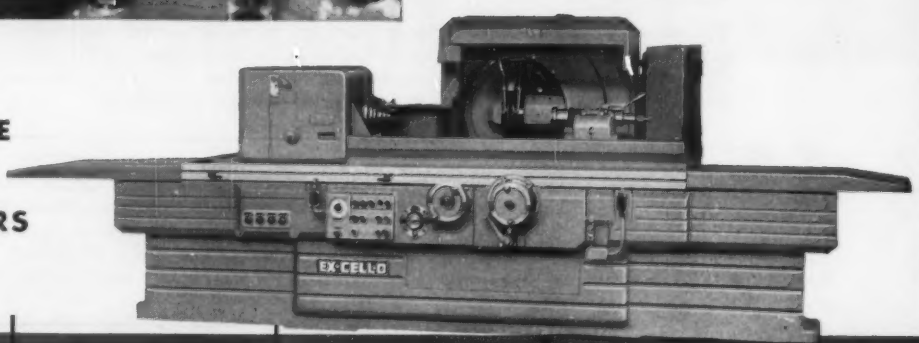
EX-CELL-O for PRECISION

A COMPLETE LINE OF PRECISION THREAD GRINDERS



STYLE 50
Precision Thread Grinder—a versatile machine for external work, also available with internal attachment.

STYLE 33
Precision Thread Grinder—a high production machine for external work.

STYLE 39-A
Precision Thread Grinder—a high production machine for internal threads.

STYLE 36
Precision Thread Grinder—a versatile machine for extra long external threads, available with internal attachment.

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53-35

Washington

Randall Commission recommendations are taken by free traders as putting the Eisenhower administration squarely behind the New Deal-Fair Deal policies of lower tariffs, simpler customs and rate structures, continual easing of US trade barriers. They feel this marks an important victory for their side in the perennial battle between free trade and protectionist advocates.

But there's another side to the picture: some of the most powerful Republicans in the House and Senate were members of the Randall Commission—Sen Millikin and Congressmen Reed and Simpson—and they dissented right down the line to the Commission's controversial recommendations.

Hence, one thing is assured: a continuation of the bitter Congressional split over foreign economic policy. As things stand now, Eisenhower might get some of the key Randall proposals enacted this year. In any event, it's certain there will be no further raising of tariff barriers.

• • •

Best guess is that there will be a three-year extension of reciprocal trade legislation—but without the new tariff cutting authority Randall asked for the President.

There's one big question mark: how much will the White House bull the Randall recommendations through Congress?

And a supplementary one: how much will individual Congressmen change their past voting records as a result of such pressure from the President?

If Reed, Simpson, and Millikin are any example, it seems unlikely that the protectionist bloc will be budged very far.

• • •

Randall report recommends that the President's authority to negotiate reciprocal trade treaties under the Trade Agreements Act, which expires in June, be extended for at least three years, and that the President be granted power to reduce tariffs without reciprocal concessions for products that are not important imports. It also recommends that the escape clause and peril point provisions be retained.

• • •

The report tackled another important angle of foreign trade policy—currency convertibility. It urged that the International Monetary Fund permit free use of its $3 billion to stabilize currencies that are made convertible. The Federal Reserve Bank was urged to open standby lines of credit with countries trying convertibility, providing a second line of defense against collapse of their currencies.

These proposals are in line with recommendations made by machine tool builders, notably Giddings & Lewis's Ralph Kraut. He says that many foreign machine tool customers would pay the higher price of US machines if they could only obtain dollars for the purchase. In financing export sales, he points out that US builders cannot offer extended terms of payment comparable to those available to buyers of English and German tools, which are made possible by foreign-government-financed insurance and credit plans.

• • •

Commerce Dept's four-month old Business & Defense Service Administration is silently doing a slick service job for industries and companies seeking help. Prime "service" area is markets—aiding US companies to defend existing markets against foreign competition, helping others develop new markets both here and abroad.

The agency's 20-odd industry divisions have sensitive roles. They're supposed to be friends in court in Washington for respective industries without acting as business lobbies in government.

Metalworking Equipment Division's main job has been in mobilization matters. It's also making an import-export study on machine tools, to be released this month. The automotive division is working with a vehicle maker interested in starting a new product. It's also helping a parts manufacturer enlarge his field.

• • •

General Components Division is aiding industrial fastener producers seek tariff adjustments to slow imports of foreign wood screws. General Industrial Equipment Division has gotten a bank loan guarantee for a textile machinery maker, helped some industries and companies file Randall Commission briefs. Railroad equipment division is working with FOA to let $20 million worth of contracts in US under FOA loan for rehabilitation of Indian railroads.

• • •

Deliveries of military aircraft now top the 1000 per month mark. That's more than four times the pre-Korean figure. Numbers-wise, this means that deliveries of military aircraft are now at their peak. But in terms of airframe weight, the peak is yet to come. The aircraft industry will continue to turn out large numbers of fighters and interceptors over the next year, bomber production will finally start to pay off. So deliveries measured by airframe weight will go up.

The outlook for 1954 is a probable drop-off to around 10-11,000 planes and about a 6-8% reduction from peak employment of 775,000 workers.

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Detroit

Some intriguing financial figures were let out by CIO President Walter Reuther at one of his infrequent press conferences, held just recently in Detroit.

If GM profits this year compare with last year's, said Reuther and UAW Economist Nat Weinberg, expiration of the Excess Profits Tax will mean a $400-million tax cut for GM.

Assuming that industry profits compare all along the line, Reuther says auto companies will save $1 billion altogether in taxes.

And, says Reuther, they're not entitled to it. The reduction should have been given to "the little people" and corporate taxes should have stayed at high levels.

Another figure served up by Reuther: EPT expiration translates into a $780,000 increase in GM Board Chairman Alfred M Sloan, Jr's take-home pay. And, says Reuther, Sloan already has enough shoes and food.

• • •

CIO approves of GM expansion plans, but by way of calling attention to unemployment (estimated by CIO at 3.6 million nationally as opposed to the government's 2.4 million figure) Reuther says "GM got $25 million worth of free publicity with its expansion announcement, but where do you find newspaper stories of Chevrolet's employment cutback? Back on Page 22." (Chevrolet laid off about 63,000 workers for two days in order to trim its production schedules.)

• • •

GM's expansion isn't quite what it seemed at first. The announcement was beautifully timed but somewhat misleading insofar as plant construction is concerned.

On the surface it looked like $1.5 billion plus in new money would go into expansion.

But now it's obvious that a big piece of the building program is already underway, or virtually completed.

Take Chevrolet, for instance: its 780,000-sq-ft Livonia spring and bumper plant was announced last April, and construction started in September. Its Flint stamping and frame plant was started last August.

And what about Chevvy's Cleveland manufacturing plant expansion, and its Engineering Center in Detroit? Both have been abuilding for months. But they're all included in the overall GM expansion announcement.

• • •

Ford is making good its threat to overtake Chevrolet. Ford outproduced Chevvy in passenger cars by 118,678 to 117,025 in January, and was just 19 units short of Chevvy truck output.

And Ford set an all-time January sales record—112,593 Ford cars and trucks, and 28,040 Lincolns and Mercurys—possibly beating out Chevrolet sales for the third month in a row.

January production by companies was importantly changed percentage-wise as against January 1953. This January, GM accounted for 46.7% of total industry output (44.8% in January 1953), Ford took 33.5% (22.2% a year ago), and Chrysler got only 14.3% (23% in 1953), for a 9% cut.

• • •

And in January the independents produced only 5.5% as against 10% last year. According to Ward's Reports, February projections indicate Chrysler will drop back even farther—to 11.9% of total output.

• • •

Despite stiff market conditions, auto makers say they can't reduce prices below current levels. But many auto dealers predict factories will knock down prices this year.

• • •

In line with this, Nash's recent price cut at first glance looked to be an average of $116 per car—biggest cut was $210, lowest $20.

• • •

But Nash took radios and heaters off the standard list, made them optional at extra cost. Together, the items are priced at about $145.

At best then, Nash price cuts are little more than token trimmings. The company is simply offering less car for less money.

• • •

The Nash-Hudson merger is forcing Nash to rename its small, low-priced NKI, scheduled to come out in March. The new name is almost as big as the car itself.

• • •

Tooling for the Lincoln Continental, it now appears, will not be completed before spring of 1955. Initial production scheduling reportedly calls for only 11 cars a day.

The Continental is expected to feature a divided landau-type roof, and front seats will be of the bucket variety. Prices may range as high as $10,000.

• • •

For the first time since their introduction in 1940, fully automatic transmissions have outsold manual shifts.

Last year, 50.1% of all new cars sold were equipped with automatics.

• • •

And 1953 looks like the first year in which 8-cylinder engines outnumbered sixes. As of mid December, 2,752,615 cars were powered by eights, 2,748,431 by sixes.

You're missing something if you overlook

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If you make tool steel parts with machined-out centers, don't overlook the many benefits of using Crucible Hollow Tool Steel.

It eliminates drilling, boring, cutting-off and rough facing operations. Naturally, this cuts overall production time, steps up machine capacity and reduces scrap losses. Many manufacturers have been able to cut material costs alone by as much as 20% when they use Crucible Hollow Tool Steel instead of regular bar stock.

Crucible Hollow Tool Steel is available in three famous grades: KETOS oil hardening, AIRDI 150 air hardening, and SANDERSON water hardening tool steels. We supply it with machine finished inside and outside diameters and faces — cut to your specific length requirements. And no steel producer can assure you of more uniform quality. For we have complete control over every phase of manufacture and distribution.

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Machine Tools

General Motors' $1 billion expansion program will consist of brand-new projects hardly any of which have yet reached the tool-ordering stage.

Plans are so fresh, in fact, that there has not yet been time to determine exactly what or how much tooling will be needed.

• • •

None of the cost of the Chevrolet V-eight engine plant, for instance, is included in the $1 billion. The engine plant was part of a project launched long before the new expansion plan had been decided upon.

It is likely that an enlargement of the capacity for building Chevrolet V-eight engines will be part of the GM 1954-1955 expansion program (which may well cost $1.5 billion before it is completed).

What machine tools will be required for Chevrolet's added engine-building facilities is not now known.

• • •

Machine tool builders will have to set aside only 40% of their output for defense-rated customers beginning March 1.

The order changing the percentage from 60% to 40% is now being issued in Washington.

The so-called critical list is not being abolished. But all types of tools on it up to now have been removed except for jig borers, jig grinders, jig millers and large types of milling machines. Only four items remain on the list.

The existing ratio of 70% for rated orders and 30% for non-rated will continue to be in effect on these critical items.

• • •

Rumblings are being heard of a big machine tool buying program for the Air Force.

It is strictly contingent upon whether the Air Force gets the bulk of the appropriations that it wants for fiscal 1955. If it does, and at this writing it appears probable, the Air Force will start to work on a new plan for acquiring a lot of new planes.

• • •

No one knows yet how much money the Air Force would spend for machine tools.

One reliable source is of the opinion that as much as 30% of the Air Force's machine tools would have to be replaced as a result of the program.

Keep in mind that the proposed program is still in the speculative stage and will stay there until Congress either grants or denies the funds that the Air Force has requested.

Should the program actually come off, it would mean heavy orders for machine tools.

• • •

Leasing of government-owned machine tools for civilian work again is a hot issue in Washington.

Army Ordnance Corps is reported to have agreed to lease some $15 million of its machines to a former Texas ordnance contractor in whose plan the machines now are stored.

The contractor does not want to use all the government machines in his shop. He is willing to pay 1% a month rental for specified tools.

• • •

The proposal was submitted by the Department of the Army to an Assistant Secretary for Defense, whose office cleared it for submission to the Office of Defense Mobilization, for final okay.

Metalworking Equipment Division of the Business and Defense Services Administration has been strenuously opposing ODM's approval.

• • •

The trouble is that a bad precedent was set when ODM gave its blessing to the Ford-Mack Truck leasing agreement, which was based on an emergency situation. That agreement runs out next June.

Army Ordnance Corps argues that the money it gets from the contractors who lease machine tools helps pay the cost of maintaining the bulk of Ordnance's tools in good standby condition, thus relieving the taxpayer of that expense.

• • •

Congressmen, spurred on by manufacturers within their constituency, are beginning to ask that government-owned machine tools be leased for production of civilian goods.

At least one Congressman has made an issue of tool leasing requested by a West Coast firm.

• • •

Some well-informed machine tool men feel that the only way to prevent the flood gates being opened wide to the leasing of services-owned machine tools is to take the fight to Congress.

The leasing practice, if permitted on a substantial scale, would provide severe competition for machine tool builders, who thus would be deprived of part of their normal market.

This is no way to maintain a healthy machine tool industry such as government officials piously say is their aim.

• • •

William Asquith, Ltd, radial-drill builder, is represented in the British Trade Mission to Moscow, which is reported to have been offered more than $1 billion of Soviet orders. Russia wants to secure $84 million of machine tools, forging machines and press equipment from England.

BF

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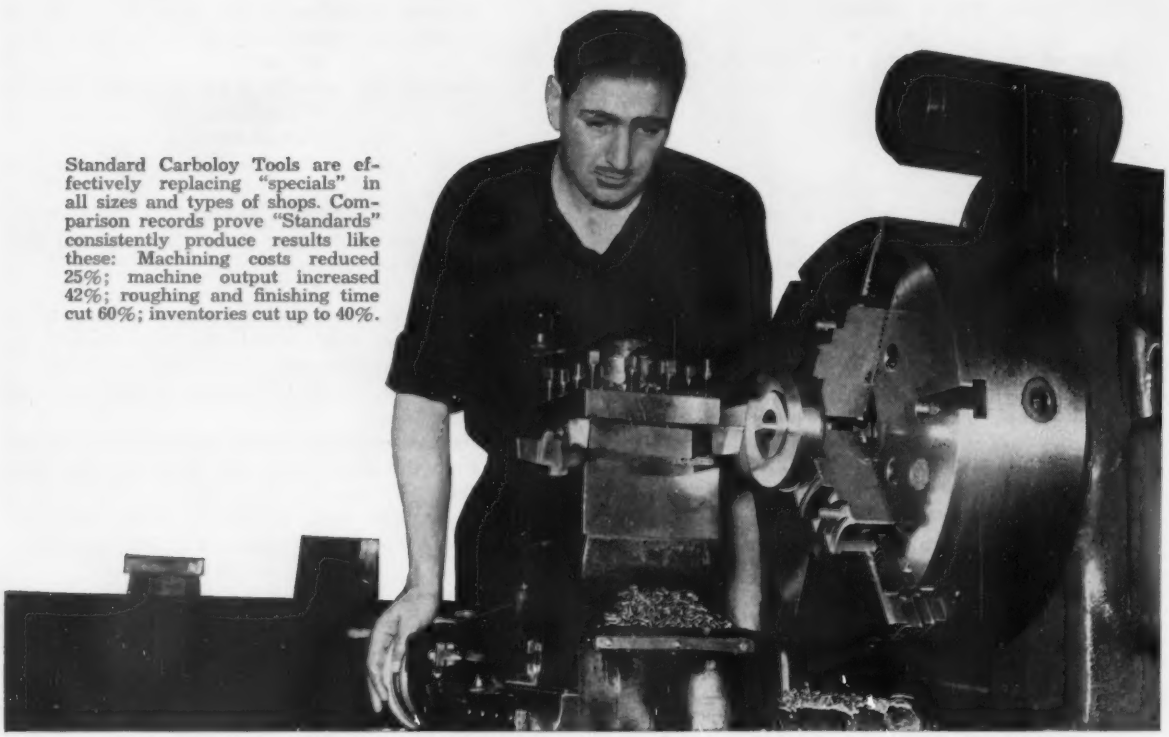
reduce inventory, increase output, cut production costs on single-point tool jobs



Standard Carboloy Tools are effectively replacing "specials" in all sizes and types of shops. Comparison records prove "Standards" consistently produce results like these: Machining costs reduced 25%; machine output increased 42%; roughing and finishing time cut 60%; inventories cut up to 40%.

JUST ELEVEN Standard Carboloy Tools — styles A to G — will do up to 80% of all single-point tool jobs . . . outlast steel tools by as much as 10 to 1. Use them "as is" for turning, facing, boring . . . or adapt them quickly to your own "specials."

By using "Standards" you'll eliminate hundreds of costly, inventory-loading special tools. You'll slash downtime to an absolute minimum. Your local Authorized Carboloy Distributor can always give you immediate delivery on all Standard Tools and blanks, insert blanks and boring tools.

Standard Carboloy Tools are available to handle every single-point tool job. Send coupon, today, for free technical literature.

CARBOLOY
Department of General Electric Company
11149 E. 8 Mile Ave., Detroit 32, Michigan

Send me the following, without cost or obligation:

- ☐ Application data on Grade 370.
- ☐ "Brief-A-Log" Condensed Catalog and Price List, GT-265, with "Standard" specifications.
- ☐ Have a tool expert call to show us how to use "Standards" effectively.

Name _____ Position _____

Company _____

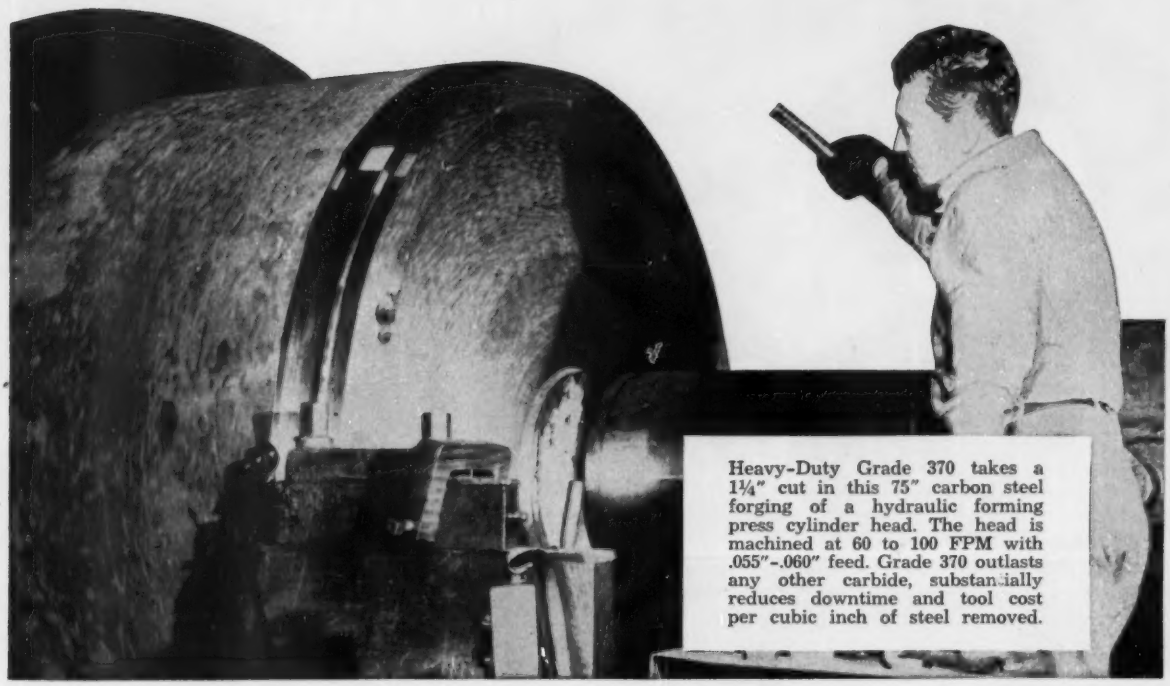
Address _____

City _____ Zone _____ State _____

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

NEW CARBOLOY® GRADE 370
CEMENTED CARBIDE

cuts more cubic inches of steel per minute— with longer tool life—than any other carbide



Heavy-Duty Grade 370 takes a 1¼" cut in this 75" carbon steel forging of a hydraulic forming press cylinder head. The head is machined at 60 to 100 FPM with .055"-.060" feed. Grade 370 outlasts any other carbide, substantially reduces downtime and tool cost per cubic inch of steel removed.

NEW Heavy-Duty Grade 370 Carboloy cemented carbide was specially developed for taking heavier cuts in steel, at higher speeds than ever before practical. Grade 370 cuts more cubic inches of steel per minute – with longer tool life – than *any* existing carbide.

Other carbides fail when machining at higher speeds because the tremendous temperatures and pressures deform their cutting edges. Heavy-Duty Grade 370, manufactured by an entirely new process, has a built-in rigidity to resist this deformation, even at temperatures of around 1800° F.

Carboloy Grade 370 is being used successfully on such tough, heavy-duty applications as rolls, gun barrels and locomotive wheels. Grade 370 lasts longer than any other carbide – *increases production by as much as 30%.*

The first of the new Series 300 steel-cutting carbides, Heavy-Duty Grade 370 is available immediately in a number of sizes and shapes. Trained engineers from the Carboloy Engineering Appraisal Service will work with you on your heavy-duty cutting jobs. Send coupon, at left, for information, and for free technical literature.

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DEPARTMENT OF GENERAL ELECTRIC COMPANY

more parts...
more operations...
PER HOUR

with...

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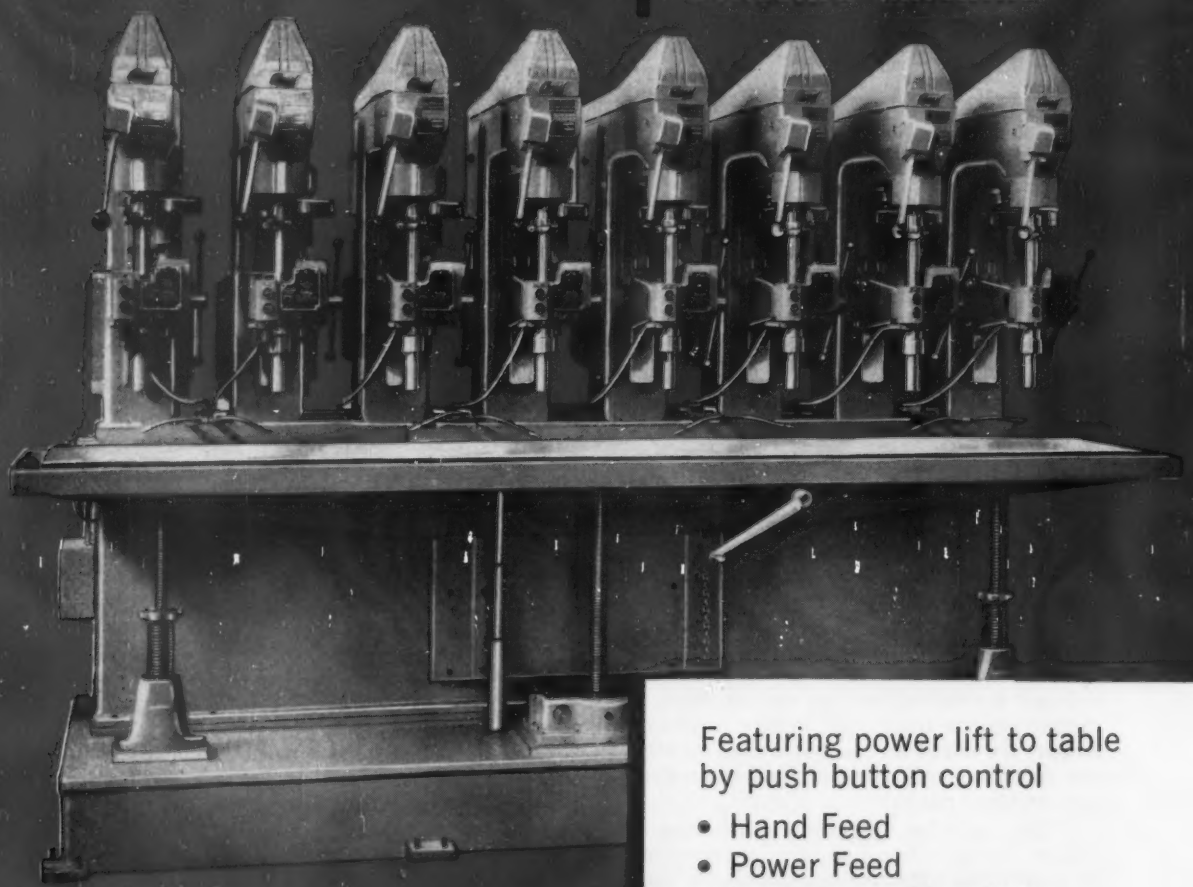
SUPER EIGHT SPINDLE
No. 2 BMA-6
DRILLING MACHINE



Featuring power lift to table by push button control

- Hand Feed
- Power Feed
- Lead Screw Tapping
- Four Feeds
- Six Speeds
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for drilling... tapping... production machines

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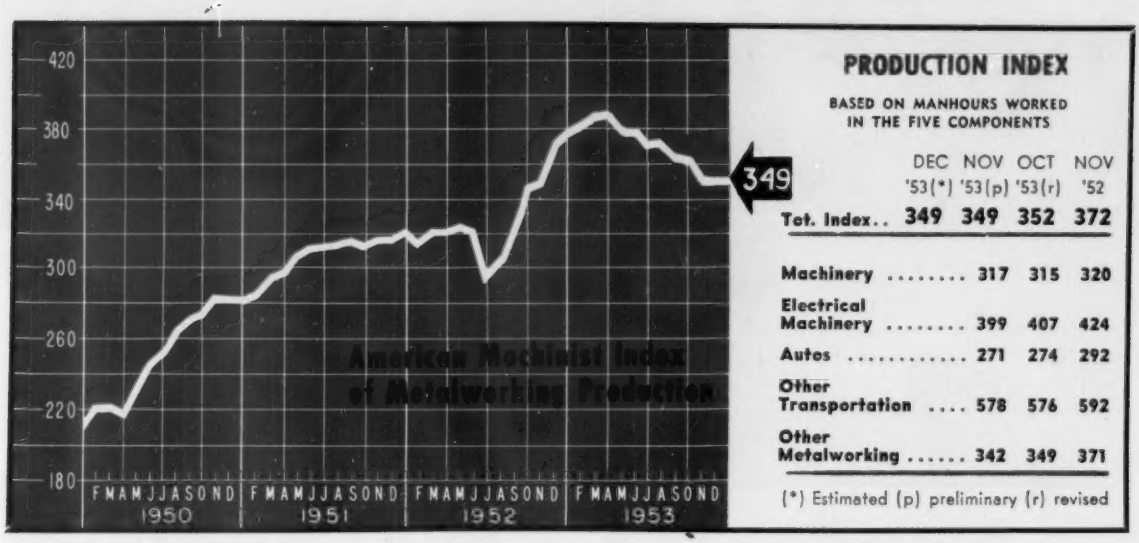
THE AVEY DRILLING MACHINE CO., Cincinnati 1, Ohio

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	DEC '53(*)	NOV '53(p)	OCT '53(r)	NOV '52
Tot. Index..	**349**	**349**	**352**	**372**
Machinery	**317**	**315**	**320**	
Electrical Machinery	**399**	**407**	**424**	
Autos	**271**	**274**	**292**	
Other Transportation	**578**	**576**	**592**	
Other Metalworking	**342**	**349**	**371**	

(*) Estimated (p) preliminary (r) revised

There is accumulating evidence that the inventory adjustment that has been going on in Metalworking is fairly well along and heavier buying may be resumed in the next 30-60 days.

• • •

Orders for gray iron castings give a hint of what's ahead. January was a poor production month, but February has picked up. Customers who have worked down their stocks of castings and have not been placing orders since last fall are again in the market.

The year looks much better now than it did. The drop from last year won't be more than 5%.

• • •

Malleable iron producers voice the opinion that January probably was their low point. Orders are coming from all over, though they are not big in quantity. Backlogs average six weeks.

For the first time in months merchant wire products are showing signs of life. That means that farmers are getting back into the market. Spring wire is doing better, thanks to furniture makers' heavy demands. Welding rod makers are asking for quotations on larger tonnages starting next month.

Steel mill operations are perking up a bit here and there, especially in the Chicago area. March will bring increased output. The ingot rate lately has hovered around 75% or a little higher.

• • •

Both good and bad news comes out of the railroad equipment field. The outlook for freight-car building is hardly cheering. Carriers are doing little buying. Builders are cutting sharply into backlogs as production outstrips orders.

Some companies are planning to curtail the workweek an thereby stretch out operations to May on passenger cars.

Report from diesel-electric locomotives makers provide the industry's good news. One big company is increasing its output 25% compared with its rate in the latter half of 1953.

The construction machinery people apparently are in for a good year. The volume probably will be down 8-10% from last year.

• • •

TV set makers feel more encouraged about prospects than they did even a month ago. Then they said with tongue in cheek that they would sell 5 million units in 1954. Now they are sure of it.

Some 100,000-150,000 color sets will be produced this year. But sales resistance may be high, because prices will be high ($800-$1200 at the start).

About 11 million radio sets, mostly automobile and tabletop models, will be built this year. That will put 1954 among the fairly good years.

• • •

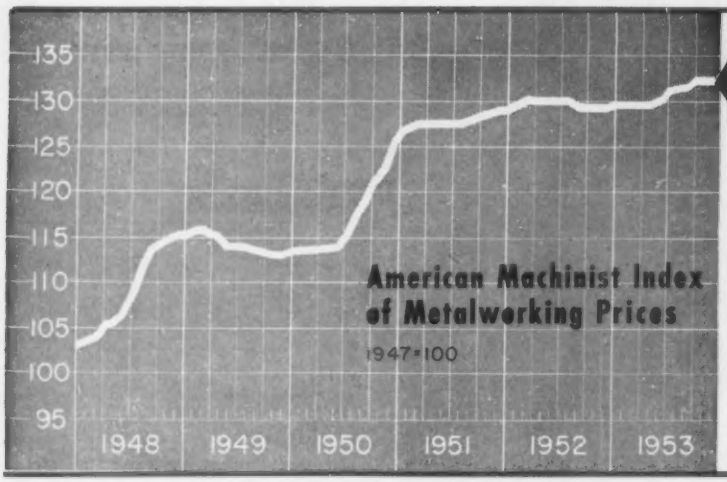
Contract tool and die shops have had a gradual slippage in business the past few months. Orders are off and backlogs are down. But the industry still has 8-10 weeks of work at current production rates. Bad part of it is that a big chunk of the unfilled business is in the hands of a few large shops.

Most of the new orders recently have come from the electronics and home appliance industries.

Defense work does not play much of a part in tool and die shipments anymore.

At last report, 59% of the tool and die manufacturers polled said that the outlook is excellent.

Gaging Business



PRICE INDEX

132.6

	DEC '53(*)	NOV '53(p)	OCT '53(r)	NOV '52
Total Index	**132.6**	**132.6**	**132.6**	**129.7**
Metalworking Machinery	**141.8**	**141.8**	**137.8**	
Other Machinery exc. Electrical	**137.3**	**137.3**	**132.3**	
Electrical Machinery	**131.9**	**131.8**	**124.5**	
Fabricated Metal Products	**129.0**	**128.9**	**128.2**	

(*) Estimated (p) preliminary (r) revised

Generally, business is good right now—by any comparision except with '53's super boom.

But the successive peaks reached in the post-war years aren't in the cards for 1954.

Instead, the decline now in progress will continue in some degree through the year.

• • •

1954 government spending will drop slightly below 1953—probably by $2 billion.

Federal budget calls for a $4-billion drop but state and local governments will increase their spending $2 billion or more.

• • •

Business expenditures will stay high in the months immediately ahead, with capital investment of about $28 billion for the first quarter of 1954.

Second quarter may be even higher. So even if the rate sloughs off toward the end of the year, 1954's total will be only $1-2 billion under 1953's.

Consumers can spend as much in 1954 as last year if they want to. Partly because of tax cuts, incomes are higher now than in 1953.

"Does the consumer have the money?" isn't the question. Now it's "Will he spend it?"

If consumers are scared off by cuts in overtime or increasing unemployment, reduced spending would affect manufacturing quickly.

• • •

Industry is trying to reduce stocks by cutting production. And it has succeeded in halting the sharp rise in inventories.

But a sales drop could bring inventories right back up again. And it could bring about further production cuts.

• • •

Early January unemployed numbered 2.4 million — 300,000 more than in January 1953.

But the December-January increase was no bigger than last year's. And many areas report the job situation is improving.

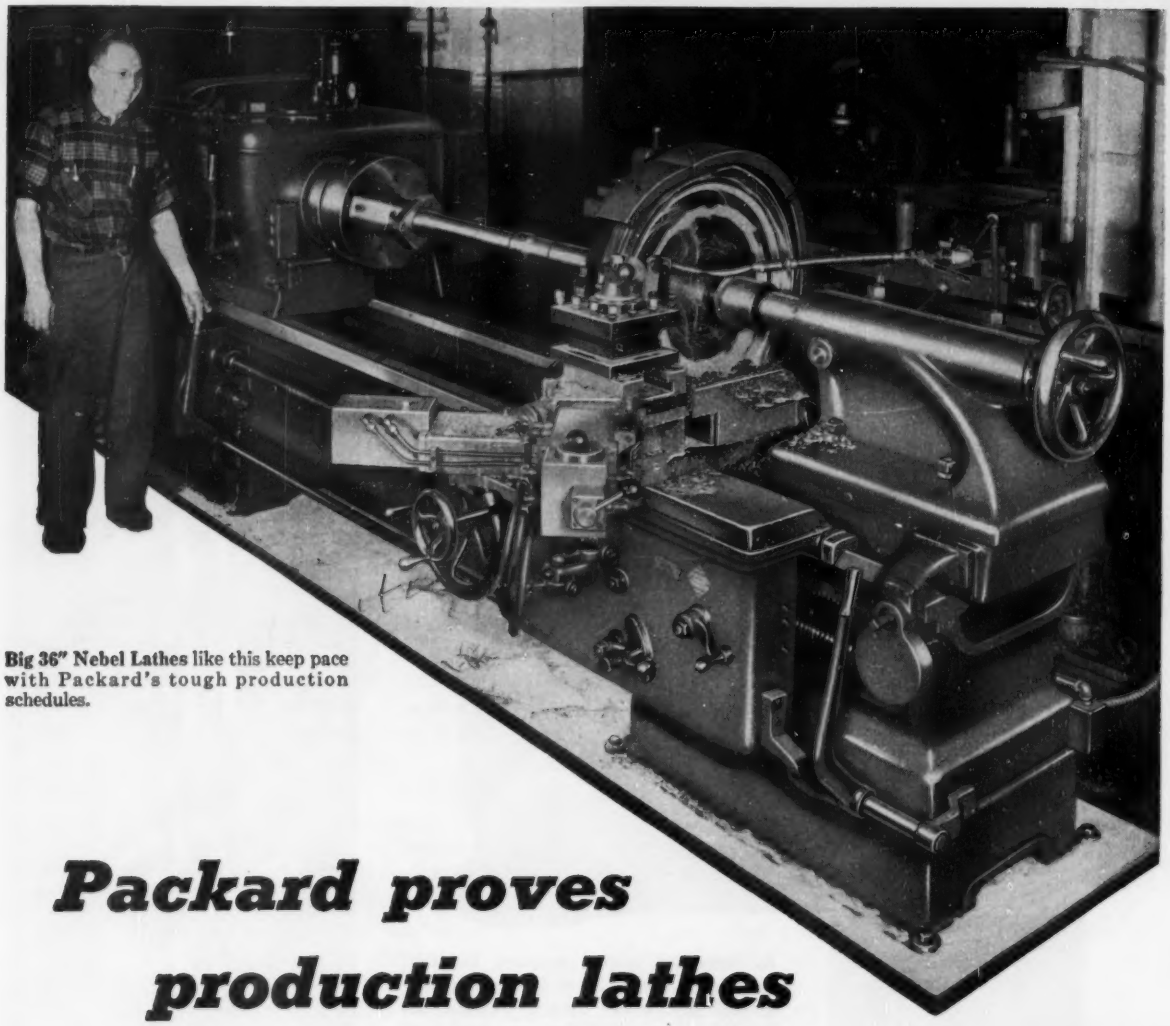
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	124.7	124.5	135.6
Steel ingot production (thousand tons)	1,762	1,802	2,202
Electric power output (million Kilowatt hours)	8,855	8,976	8,151
Production of automobiles and trucks	146,316	146,741	150,289
Engineering construction awards (*Eng. News-Record*, millions)	$194.3	$171.1	$288.5

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	197	140	268
Vacuum cleaners sales (thousands of units)	191	216	249
Washers sales (thousands of units)	192	238	311
Household electric ranges sales (thousands of units)	74	73	87
Radio production (thousands of units)	1,101	1,061	1,325
Television production (thousands of units)	450	561	921
Gear sales index (1947-49 = 100)	194.0	144.9	140.9
Foundry equipment new orders index (shipments, 1937-1939 = 100)	494.3	455.8	343.3

* Seasonally adjusted



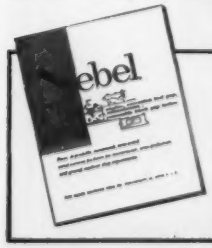
Big 36" Nebel Lathes like this keep pace with Packard's tough production schedules.

Packard proves production lathes needn't be expensive!

Packard Motor Car Co. uses 8 Nebel heavy duty engine lathes—*with precisely the right combination of Nebel attachments* necessary to produce jet engine turbine wheels and shafts.

Nebel lathes are like that: they're basic. They aren't loaded with expensive "extras" you may never need. Yet you can add attachments and accessories *you need* at any time. That's why Nebel lathes—heavy duty engine, removable block gap and extension bed gap—are your very best lathe buy.

Nebel's a natural for maintenance or production. Write for descriptive catalog today. The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A. Members of the National Machine Tool Builders' Assn.



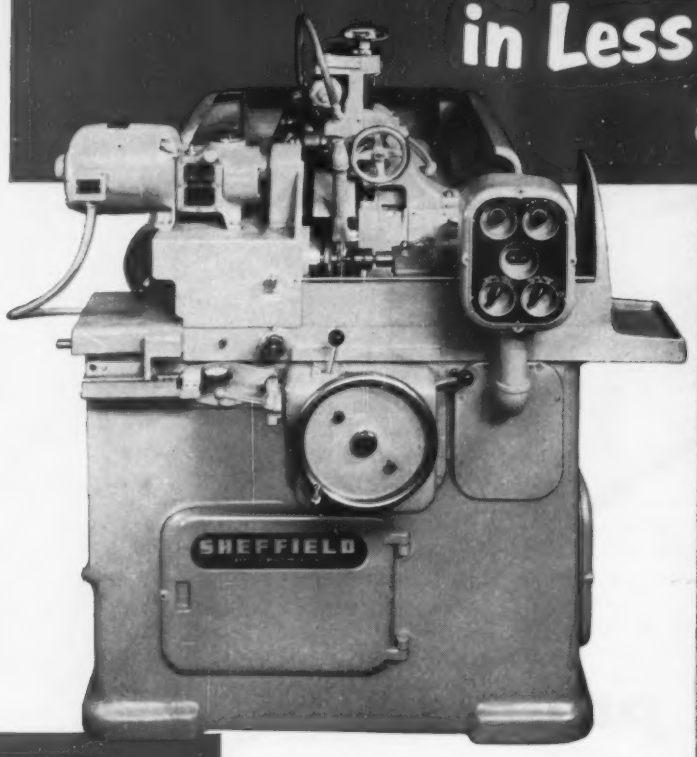
SEE WHY NEBEL'S YOUR BEST LATHE BUY!

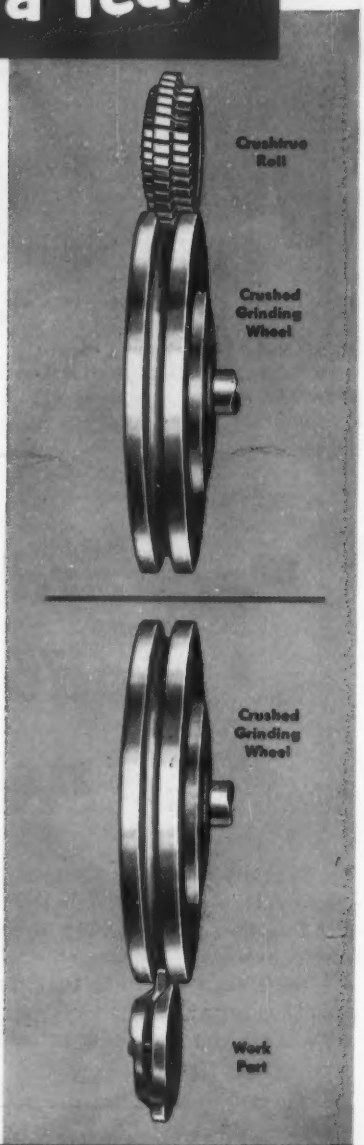
Powerful 20-page booklet tells you how a lathe can be so good and yet cost so little. It's yours without obligation. Send for it today.

Nebel

the workhorse of the metal-working shop since 1899

Savings amortize this CRUSHTRUE GRINDER in Less than a Year





To finish this sewing machine bobbin, both faces and O.D. of the flange are ground and outer corners chamfered. Formerly it required five men and five different machines to turn out 68 pieces per hour.

Now, **one** Sheffield Thread and Form Grinder, performs all **five** operations simultaneously—**one machine with one operator** instead of five machines with five operators.

And production is 85 pieces per hour instead of 68—**a 27% increase.**

The first 12 months' savings in direct labor were more than enough to pay for the Crushtrue Grinder.

Simple forms and threads—and profiles so difficult as to be considered almost impossible to reproduce otherwise—can be Crushtrue ground with savings as much as 70%.

Ask to see the automatic sound slide films on Crushtrue grinding—they can be shown in your office.

6289

the Sheffield CORPORATION
DAYTON 1, OHIO, U.S.A.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Is Automation Your Dish?

Automation is a magic word these days. "It has snow-balled into being the nation's major industrial phenomenon," to quote one authority. It also has been called a new phase of the industrial revolution.

Whatever your opinion of it is, don't underestimate it. It is deserving of your respectful attention and study. If you push it aside because you have the impression that it is only for the big companies like Ford, you had better take another close look at it.

Automation, in its broad sense, is essentially doing by mechanical means what heretofore has been done by hand. It helps to increase productivity, to secure greater accuracy and to cut costs of machining, forming, measuring, assembling and inspecting metal products.

Its most spectacular results up to now have been attained in such mammoth operations as the engine plant at Cleveland of the Ford Motor Co. It has been widely applied, and publicized, in the automobile industry. It has been put to work successfully in other mass-production industries. At least semi-automatic production of TV and radio sets is an accomplished fact.

But, we repeat, just because most of the publicity about automation has been associated with the major automotive manufacturers, don't get the idea that it is not your dish.

Lots of people are at work trying to apply automation wherever metalworking is done. They are studying many problems connected with it—design of the automated equipment, design of the product to which automation is to be applied, adequate maintenance of automated equipment, how to minimize down-time.

They are concerned primarily with the economics of automation. After all, the determining factor in whether to automate or not is simply: Will it pay? Just what is the cost of automation? The initial cost of the equipment may be high but the unit cost of production may be low.

It is obvious that automation is so important, in the years ahead even more than now, that it deserves the best thought of management. It is not a development to shove off onto a minor official to look into at his leisure.

If you have not done anything about it thus far you should get busy without delay. It is not a one-man job. It is too big for that. It will require the teamwork of your best design engineering, tool engineering and production talent. What's more, top management should be in on the planning and should help guide the whole program.

Automation holds promise for the job shop as well as for the production shop. Its use is spreading fast. In a competitive period such as we now are entering it will be of special value.

Be sure that you have an organization that can do justice to the benefits that automation may hold for you. And remember that its maximum advantages can be achieved only in a plant which is equipped with modern machines.

Burnham Finney

Photos courtesy Kirk & Blum, Cincinnati, Ohio

72 HOLES

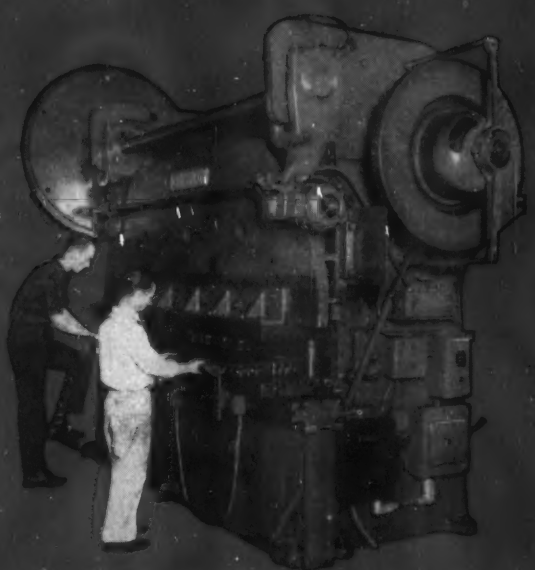
where they belong

Economical assembly depended on maintaining the accurate spacing of these 72 holes and their accurate positioning on this 10-gauge sheet.

This Cincinnati Press Brake is giving a high production at low cost by its speed and accuracy of performance, which insures rapid low cost assembly.

As a press, they offer high production with low investment. As a Press Brake, their low set-up costs, quick change-overs and versatility bring profits.

Write for Catalog B-4 where many examples of the versatility of Cincinnati Press Brakes are illustrated.



CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

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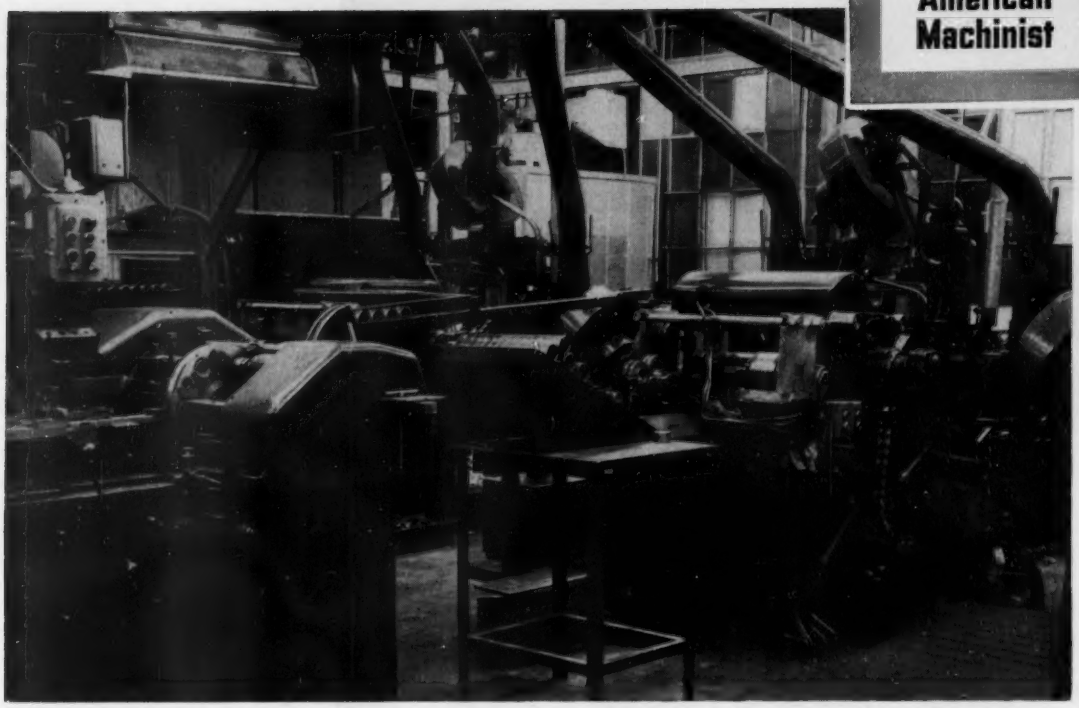


COMMUTATORS are fabricated on special machines. Bars are built up, wrapped and pressed into a carrying ring, the commutator dovetail is coined, glass cloth is blanked and assembled with core and V-rings, core is sized, assembly is ejected

get your special machines off to a good start

With the "heat on" to cut costs,

it is helpful to know the experience and philosophy of an organization

that has built 1100 special machines for its own use

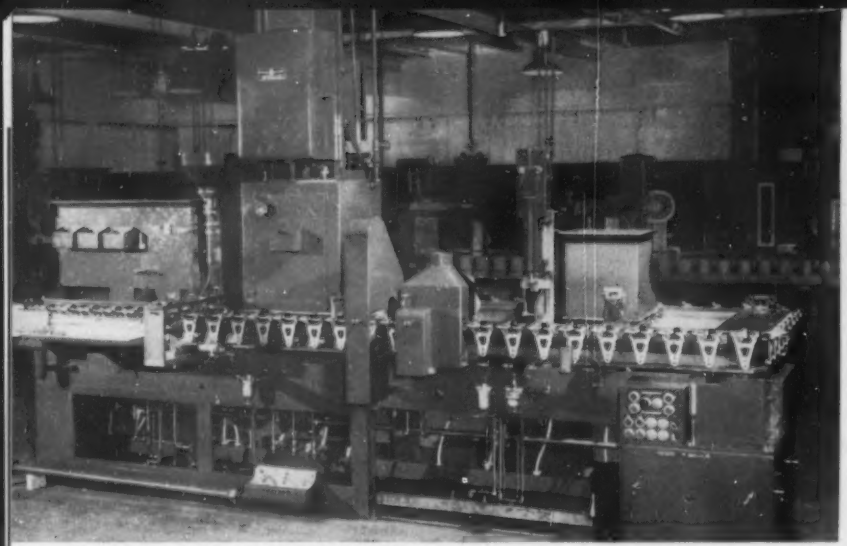
C A NICHOLS, Director of Facilities, DELCO-REMY DIV, GENERAL MOTORS CORP, ANDERSON, IND

Before you undertake the design and construction of special machinery, make certain that three favorable conditions are present in your company:

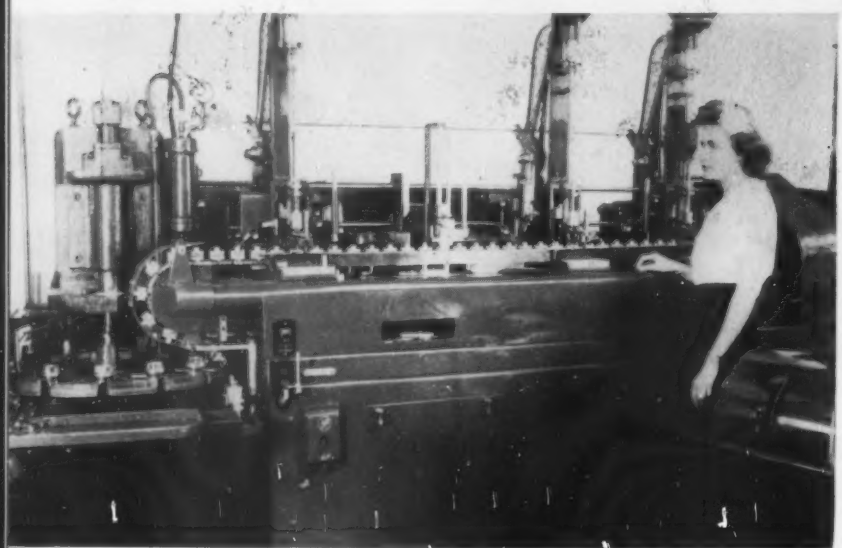
1. A progressive and patient management
2. Skilled tooling and maintenance help
3. Production supervisors who will cooperate in planning special machines, and who will wholeheartedly attempt to make the equipment work after installation.

Obviously a special-machinery-building program can be successful only if your management knows a good deal about manufacturing methods. They will then realize what you are trying to do, they are better able to judge the worth of the gamble, they can offer guidance in many ways, and they will back you up when things go wrong and delays occur.

Because they are the first of their kind, special machines are likely to have many more faults than standard ones. You will need patience and support at all times on the part of management, especially while you are taking the "bugs" out of special machines. For at this time fully 20% of the cost of the equipment will be expended, you are under



DISTRIBUTOR levers are assembled on an in-line machine. Special attachments for welding, riveting, machining, parts feeding, and inspection can be used



TRIP to shotgun-shell plant produced the idea for this machine that assembles condensers for automobiles. Employe suggestions are another source of ideas

AUTOMATIC condenser winding machines wind alternate layers of aluminum foil and paper, cut off, and apply adhesive to secure the winding. Three operators serve several machines

pressure to get into production, and at the same time you will be called upon to exercise your skill, knowledge and ingenuity to the utmost.

It isn't likely that you will get the machine to work properly and continue to do so, without having adequate tooling and maintenance personnel. As with any machinery, you must have proper care of tools plus normal repair, adjustment and lubrication. But in addition it is likely that help skilled in hydraulics and electronics must be available. Special machinery, these days, and automation equipment, too, depends greatly upon both hydraulics and electronics for functioning and control of machine elements and mechanisms.

Now, management can demoralize a special-machinery-building program by indifference or criticism, and you can achieve the same result by neglecting to enlist the cooperation of production supervisors. From the start, use every effort to convince these men that their interests are being considered. Get them to attend meetings while the design is being threshed out and obtain their suggestions and criticisms. If supervisors have a part in the actual design, they realize: (1) the equipment is being built for them, and is not being forced upon them, and (2) having taken a hand from the beginning, any failure of a special machine is in a measure a reflection upon their ability.

STIMULATE IDEAS

You build the cooperation of others and gain from their experience by welcoming ideas or suggestions for special machines. Canvass top management, production supervisors and design engineers for dissatisfactions with present methods. Study production methods for parts with an unfavorable profit position. You will probably

• HOW TO EVALUATE PROPOSALS FOR SPECIAL MACHINES

1 . . *Actual* Present Production Rate:

Do not accept the recorded or accepted figure. A recheck may disclose that the actual rate is lower or higher than thought, or that it can be improved by relatively inexpensive changes. Always compare estimated performance of the proposed special machine with the best possible performance of the present method.

2 . . Usable Rate of Proposed Machine:

In a balanced line, the production rate of the proposed machine is determined by the preceding and following machines. If not placed in a balanced line, production rate of the special machine is determined by time and motion studies. If multiple machines are needed, it may be profitable for one operator to serve more than one unit, even though the productive rate per machine is reduced. Very expensive machines would be operated additional hours per day.

3 . . Effect of Schedule Changes:

Estimate the maximum production required by seasonal demand, and the number of hours daily or shifts to meet such a schedule.

4 . . Cost of Special Machine:

Never overlook adding say 20% to design and building cost for "taking out the bugs." These hidden costs can reach 100%.

5 . . Effect of Product Changes:

Consult engineering and sales departments about product changes, to estimate whether the equipment cost can be amortized before the machine is obsoleted.

6 . . Explore Product Improvements:

If a considerable expenditure is evident, consider changes in manufacturing methods, ask sales and engineering to study the product for desirable changes to improve quality and simplify manufacturing. Often minor concessions by engineering will simplify the special machine.

7 . . Future Adaptability of Machine:

Try to design the machine so that you do not restrict producing pieces of different size or design. Sometimes even minor product design changes obsolete expensive machines. If there is assurance of no product change over a long period, universal features may be eliminated to reduce cost.

8 . . What Skill Will Be Required?

Potential savings are influenced by the hourly rate to be paid by type or skill of operator.

9 . . Effect on Preceding Operations:

Condition of parts fed to a special machine may force improvement or changes in preceding operations. This situation can either adversely affect the installation of the special machine or lead to further cost reductions. Generally speaking, improvement in the parts will be desirable even though the operation under consideration is still to be done by hand.

10 . . Plant Changes:

Do not forget that you must include the cost of installing a special machine, also conveyors, ventilation, more transformer capacity, additional power, gas, air and water lines, when calculating the return on the investment.

11 . . Salvage Value:

Credit the salvage value of displaced equipment to the savings estimated for the new method.

12 . . Consider Material Cost:

The new method may change the amount of material consumed, or its specifications and cost. Any additional cost for material may nullify savings.

13 . . What Is the Scrap Loss?

A special machine may not produce the estimated return because of scrap losses or cost of reworking defective parts. The percentage of rejects must always be considered.

14 . . How Is Plant Overhead Affected?

Installation of a special machine can affect plant overhead in five ways:

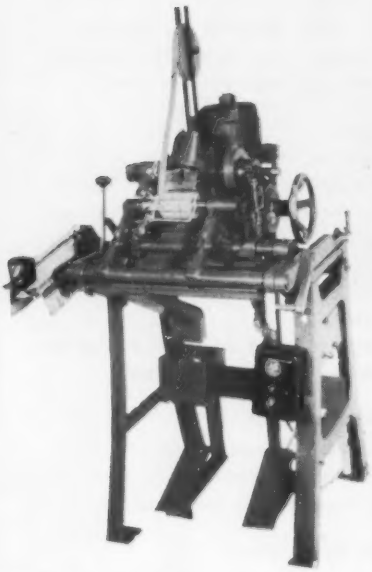
(a) *Perishable tools and non-productive supplies*—Savings estimated for a special machine may be decreased by increased costs for perishable tools and non-productive materials, or they may be increased by decreasing these costs. Example: A special broach for flash removal did not save labor but costs were reduced by eliminating the purchase of grinding wheels.

(b) *Cost of utilities*—Power, gas, steam and air consumption affect costs. Hand unloading may be as cheap as an air blast.

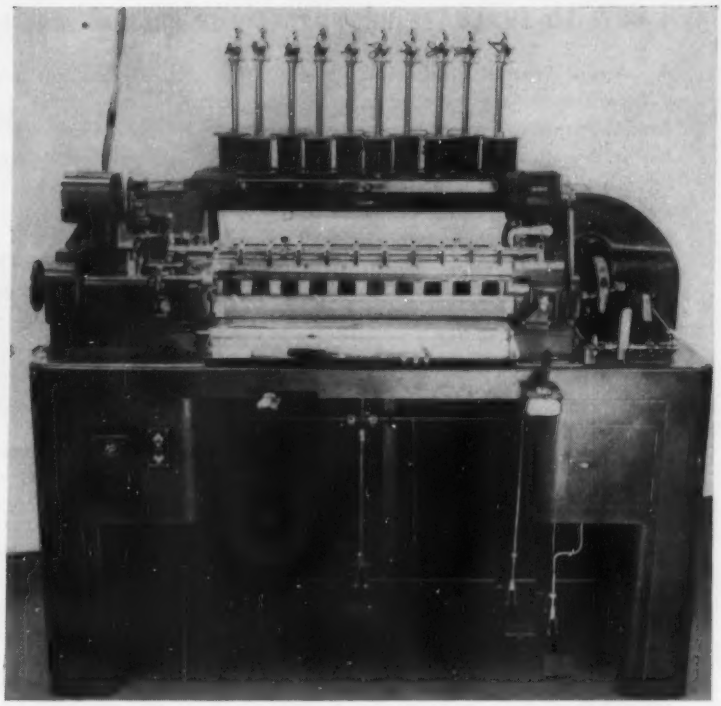
(c) *Maintenance costs*—Average cost of machine and tool maintenance over the *life* of the equipment should be considered. Generally these costs increase with complexity of the machine.

(d) *Depreciation*—Annual charges for depreciation, insurance and taxes are altered by the changed capital investment.

(e) *Effect of reduced labor cost*—A machine built on a labor-saving basis will increase plant burden, since other costs are prorated against a lower labor cost. If extensive installation of special machines for labor savings is followed, management should be prepared for an increase in overhead percentage.



AUTOMATIC lead-connecting machine improved notching of commutators for generators, paid for itself in 18 mo



SPECIAL winding machines, built 12 years ago, were streamlined and solidly built. As a consequence, maintenance has been below average

find a better approach. Visit competitive and non-competitive plants with your associates. The last suggestion often brings forth good ideas. Example: our Production Engineering Group toured a plant making shotgun shells, came away with an idea for a better and cheaper way of assembling automotive condensers.

Once you get ideas flowing freely, the next step is to screen out those that are not economically important. Make a rough estimate of labor savings for an assumed production rate by the new method, and a rough estimate of equipment cost. If the figures look favorable, then proceed with a detailed analysis. We like the procedure outlined under "How to Evaluate Proposals for Special Machines." And if the job is sizable, call a meeting with representatives of these groups: production supervision, product engineering, plant engineering, machine-building supervision, machine design, and cost accounting, to go over the proposal.

REVIEW THE ROUGH DESIGN

As soon as the special-machine designer has prepared a rough layout, call a design conference under the chairmanship of a skilled and tactful leader. Supervision now has a better chance to visualize what you propose, and can make more intelligent criticisms based upon shop needs. At this meeting, it is again well to follow a definite procedure like the "Check List for Design Conference."

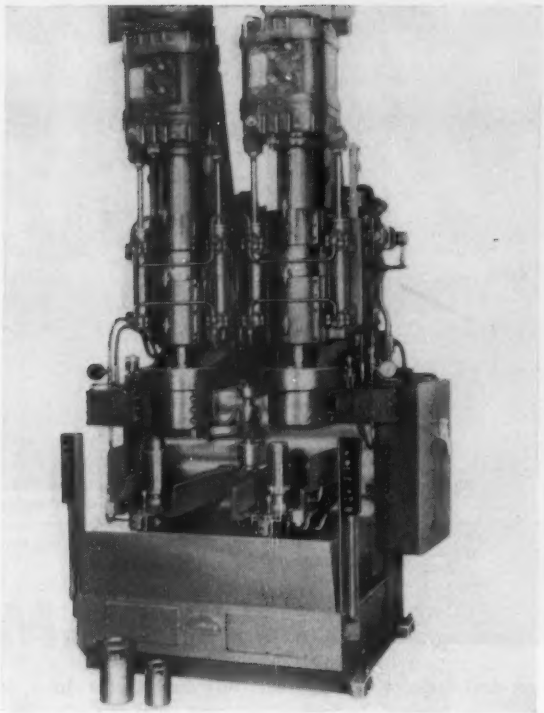
With layouts approved, finish the design and make a detailed project report covering present and proposed methods, estimated cost of new equipment, estimated savings, and return on investment. Complete and accurate data are required for management approval of an appropriation to build the machine.

HOW TO MAKE THE MACHINE WORK

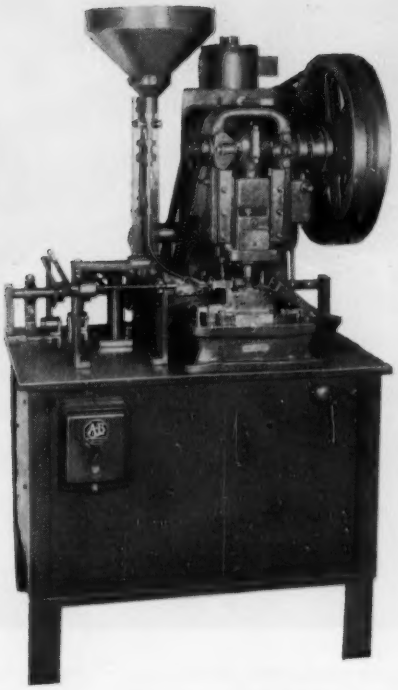
During construction, the designer should work along with the shop, but the latter must have a free hand to introduce any changes deemed necessary to make the machine successful. Then, after the machine is assembled, you will have to spend a period taking out the "bugs." Experience and judgment are the only guides. You can't refuse to make necessary changes, but you can't go off the deep end with radical changes—if the machine is ever to reach the shop.

When the machine performs reasonably well, turn it over to an operation trainer. This man is interested in the machine only as a means to produce so many parts per hour, whereas the machine builder seeks perfection and can't quite ever let the machine go without further improvements. A good operation trainer gets a new machine into the production line in the shortest possible time. He understands people and their capabilities.

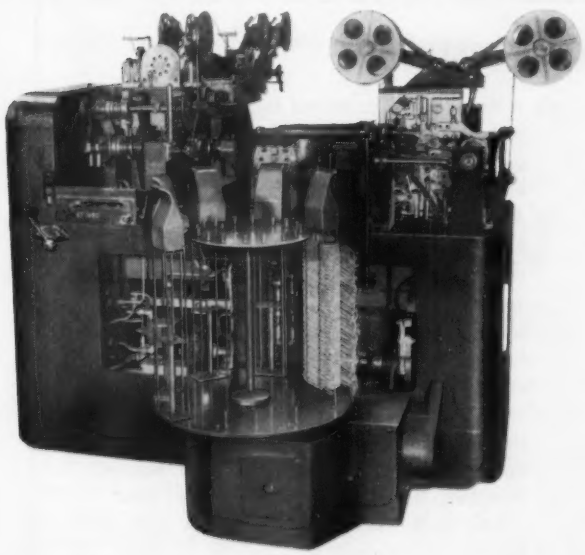
Within a reasonable period, check performance of the machine against the original estimates.



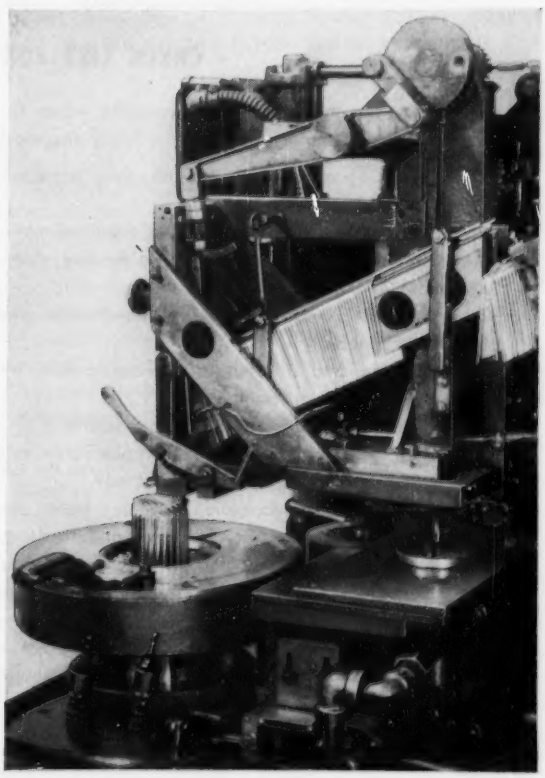
FRAMES for starting motors and generators are bored on a special machine typical of equipment for automotive specialties



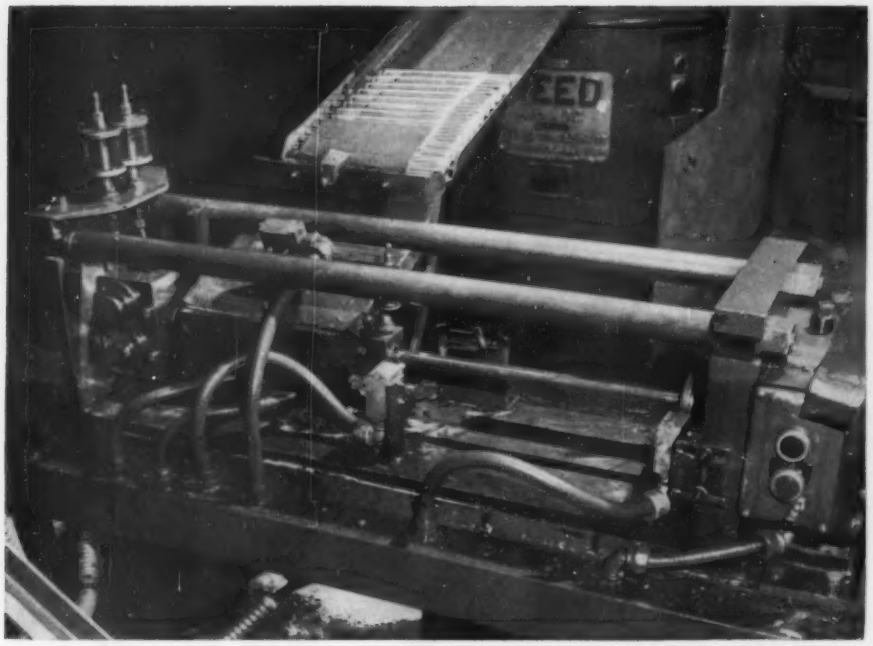
LOOPS on the ends of coil springs are formed by a special machine. Controls are convenient to operator



COIL winders are built in great variety



CONDUCTORS for motor armatures are gathered and assembled by this special machine



DIE at left of special machine forms splines on ends of generator shafts. These hollow shafts are cold-rolled from sheet stock. Pressing the spline avoids bent and galled shafts. The machine is fed automatically

Study any variations from expectations and record them for use in future designs.

In short, as you have surmised from our procedure, it is well to set up an organization and definite plan for originating, designing, building and trying out special machines. The "mechanical genius" has and does build some very fine machines, but he selects jobs of personal interest. The organization, on the other hand, covers all bases, develops broadly dispersed skills, and operates like a business.

• CHECK LIST FOR DESIGN CONFERENCE

These are the major points to consider when the rough layout of a special machine is being discussed:

1.. Motions of machine components, their sequence, timing and minimum cycle.

2.. Machine type that best satisfies required movements and sequence—station-type dial, in-line, drum, and whether horizontal or vertical.

3.. Forces to be transmitted by movements; also feeds and speeds.

4.. Best means to transmit forces—mechanical, hydraulic, electrical or pneumatic.

5.. Layout and critical features of machine:

(a) Are wear parts adjustable or replaceable, and are wear-resistant inserts indicated?

(b) Have proper lubrication facilities been provided? These are often forgotten and hardened parts must be annealed to machine oil passages. Excessive lubrication is unsightly and may damage the work.

(c) Are controls convenient to operator? Does an automatic machine have provision for single-cycle operation and inching?

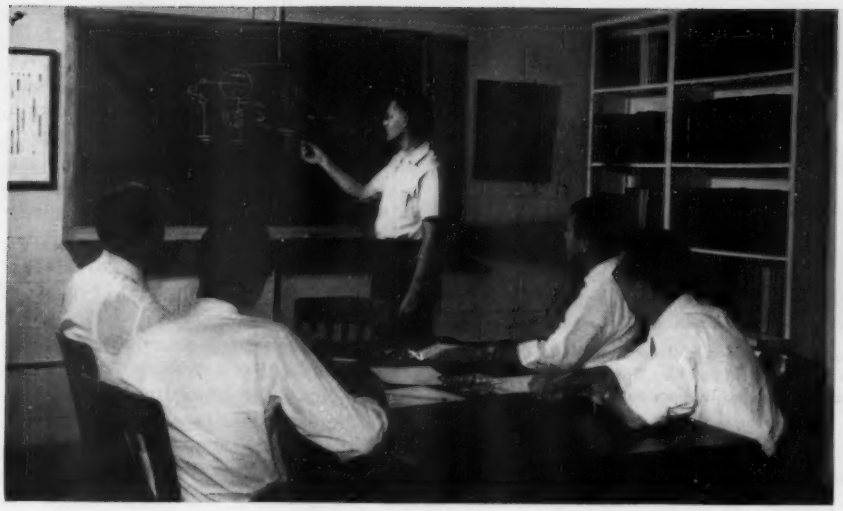
(d) Is the machine protected by overload devices and sequencing controls? Have adequate guards and feeding devices been specified for operator safety?

(e) Minimize the operator's duties but leave him enough work so that he must stay at the machine. Consider the need for comfort and variations in physique.

(f) Good appearance costs little. Heavy streamlined guards suffer little damage over the years, chromium plate on controls and main parts creates operator respect. Paneling carried to the floor makes it easy to clean floors. Include compartments for tools, and for a woman's handbag, if women operators will be used. A solidly built, "streamlined" machine will cost less for maintenance.

(g) Have you used "trick" mechanisms? Simple, proved mechanisms are familiar to tooling and maintenance personnel.

(h) Does the design incorporate eyebolts and lifting lugs? The machine might have to be moved.



NOW AN ENGINEER, this man is shown taking the oral part of his examination by the four-man review committee. Starting as an experienced technician, his knowledge shows him capable of engineer responsibilities. Thus, company acquires hard-to-find skills

MAKE YOUR OWN ENGINEERS

Is it the degree or the knowledge that make an engineer? Discharged veterans and others employed in industry as technicians frequently have acquired years of practical experience and more than usual academic training. Their experience includes installation, maintenance, and repair of complex equipment. As a consequence, they feel qualified for and are striving toward engineering status. Here is a plan to help them and the company

HOWARD J GRESENS, Personnel Manager, AIRBORNE INSTRUMENTS LABORATORY, INC, MINEOLA, LI, NY

To encourage the advancement of these exceptional technicians, and to admit to engineering status those qualified for such status, an Engineering Qualifications Review Committee has been set up at Airborne Instruments Laboratory. The committee is proving to be an effective adjunct to the personnel office. Opportunity for advancement from technician to engineer adds to the over-all company program for promotion, improves the utilization of latent engineering talent, and helps to meet the engineering shortage.

ENGINEERING QUALIFICATIONS

The work of the Engineering Qualifications Review Committee is part of a broad program for internal promotion, but deals specifically with advancing technicians to engineers. This advancement presents a special personnel problem arising from the legal distinction between a technician, as a nonexempt employee, and an engineer, as a professional and therefore an exempt employee, in accordance with the Fair Labor Standards Act. This Act sets forth strict qualifications for engineering status.

As a talented technician develops proficiency, he may do more work of an engineering nature. Such an outstanding man should be encouraged and motivated by his immediate engineering supervisor to advance his academic training. Thus, the program of advancement described here is closely related to cooperation between the company and local colleges; some technicians achieve engineering status directly through obtaining an accredited bachelor's degree.

Military and trade experience may equip an older man to do engineering work. An accepted way for officially recognizing his status by advancing him within the company is becoming necessary. Unfortunately, not every candidate may be acceptable for engineering status. The work of the committee must be handled circumspectly to avoid permanently discouraging a technician who does not qualify.

The organization in which this advancement technique is being developed is a closely knit laboratory consisting of some 650 employees, about 150 of whom are engineers, and 200 technicians. The work centers around engineering research and production.

Need for advancement over a

LABORATORY NOTEBOOK is kept by each technician and engineer. Here the candidate discusses his work of the past year with committee members. His understanding of problems, as well as any personal contributions to the project is important to the evaluation

wider-than-usual range of job categories developed slowly. Somewhat over a year ago, the need assumed proportions that required positive action. Meanwhile, Federal Telecommunications Laboratory, Nutley, NJ, had been dealing with a similar problem. Accordingly, we adapted their basic technique to our particular environment. In this connection it is well to point out the importance of fitting each personnel practice to the particular aims of the local group even though the present problem of the group appears comparable to a present problem in another group.

Advancement from nonexempt to exempt status has many ramifications: Wage and Hour laws, professional standing, the company and the individual. The need for advancement is best described, however, by the manner in which a technician sees himself in relation to his working associates, especially the engineers. Engineers supervise the activities of a team of engineers and technicians. Because of their job classification, technicians are usually assigned the routine phases, which may not challenge their highest skills.

After studying the problem and its solution at Federal and at other companies, we established our committee. Membership consists of three men chosen from among the engineering supervisors. These members are selected for their academic background, a reputation within the laboratory community for fair and impartial treatment of problems, and a thorough familiarity with the engineering activities of the company. A member of the personnel office was included on the committee because of his knowledge of the Fair Labor Standards Act and his access to records.

INITIAL ANNOUNCEMENT

After planning and outlining the procedure to be followed, the newly appointed committee published a carefully worded article in our "Management News." Much of the future success of the committee depended on clearly communicating the total purpose of the committee to all employees who might become eligible for advancement from technician to engineer.

After a candidate has been with the Laboratory one year, he qualifies for consideration by the committee. He first discusses with his immediate supervisor the advisability of applying for consideration. The supervisor, if he believes a candidate capable of doing engineering work, sends a recommendation to the committee. The committee reviews the recommendation and the academic and experience records of the candidate as given in his employee folder. If the committee concurs with the supervisor, it asks the candidate to complete the initial portion of a form "Record of Action."

After the committee receives the completed form, it meets with the supervisor to review in detail the qualifications of the candidate. The committee closely questions the supervisor to learn his opinion of a candidate's abilities, attitudes, potentials, and how well he will represent the Laboratory in discussions with outside engineers.

This meeting with the supervisor is the first of three steps in measuring a candidate's qualifications. These steps are: (1) supervisor's opinion, (2) interview and oral test, and (3) written examination. By these techniques the committee learns whether a candidate possesses a sufficient general knowledge of engineering and sufficiently detailed knowledge of his specialization to carry out engineering assignments effectively.

Next, the committee meets with the candidate to question him relative to his schooling, previous experience, other work, and study. In general, important details of academic work, industrial experience, and military service are first discussed.

Then, because each candidate has been with the company at least one year, he is always asked to describe and explain the work he has done. He does this with the aid of his laboratory notebook. Careful attention is paid by the committee to his understanding of the technical details of his work and to his interest and knowledge of the ultimate aim of the project. Original engineering contributions made by the candidate during the project are of great interest to the committee.

INTERVIEW AND ORAL TEST

Because a candidate for professional status should command a grasp of physics, mathematics, and engineering fundamentals, the engineering members of the committee next ask him basic questions of fact. This oral test is considered of utmost importance. He is asked each question orally and individually by a committee member. As the test progresses, questions are put that require a candidate to apply engineering principles to problems.

Although the test centers around direct oral questions and answers, considerable discussion generally develops that brings out the candidate's mental processes. Every effort is made to elicit specific answers. Questions are asked that are neither tricky nor indecisive but instead are fair, understand-

able, and challenging to a candidate's command of fundamentals; some questions deal with situations wherein conflicting requirements must be reconciled. A candidate demonstrates his answers with diagrams, sketches, and written solutions.

The location and atmosphere of the meeting between the committee and a candidate are of utmost importance. Because a candidate is naturally under considerable strain, it is vital that the committee encourage him by every means if a fair evaluation is to be made. Conducting the interview in a relaxed conversational vein, with an occasional new question, has proved desirable. The interview should be conducted in a quiet and comfortable location. The member of the committee from the personnel office arranges these details.

WRITTEN EXAMINATION

At the conclusion of the oral test, the committee gives the candidate a list of questions for a written examination. This always includes a question requiring an appreciation of the engineering significance of an equipment with which a candidate has already worked. The questions are prepared in advance by the engineering members of the committee thoroughly to challenge the candidate's academic training and practical experience with problems in his specialty.

The candidate reads these questions in the presence of the committee and makes any inquiry of his own regarding them. The committee endeavors to answer to his satisfaction. A time is agreed upon between committee and candidate for his completing the examination; he is expected to show his solution to each question. He may use any published literature in working out these solutions; in fact, one purpose of the examination is to test his ability to use technical literature. The only restriction is that he seek counsel or advice only from committee members.

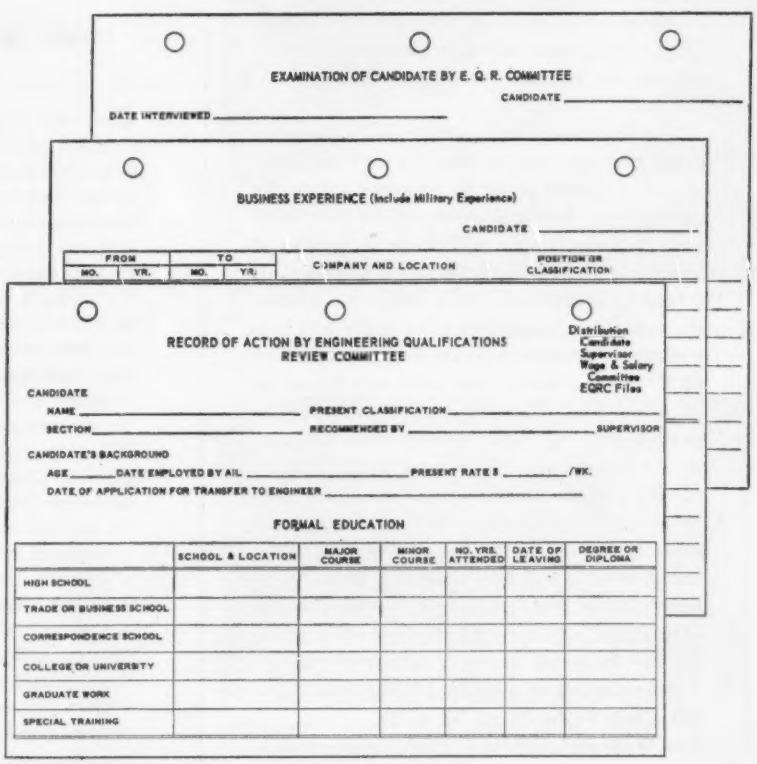
The results of the oral test and written examination may show that a candidate could not carry out an engineering assignment. In this case, a candidate receives a prompt, thorough, honest appraisal of his shortcomings and of the committee's decision. This appraisal is presented either in person by a committee member, or preferably, in a meeting with the entire committee.

Recommendations are made by the committee that, if followed, could lead to a candidate's qualifying in a future examination. Rather than tell a candidate that he has "no chance," the committee generally suggests an educational program that would prepare him for undertaking engineering work. It may be that a candidate cannot or will not so prepare himself for an engineering status, but the suggestion returns the issue to the candidate; in the long run only he can solve his problem.

The more pleasant outcome results when a candidate returns within the alloted time an examination that displays a professional command of engineering. A candidate is given an opportunity to see the committee's comments on his examination.

The written examination usually completes the qualifying steps for a candidate. The committee holds a final meeting at which it draws up a formal recommendation considering, (1) the academic background and practical work experience of a candidate, and (2) the extent to which he has developed through this experience. To date, unanimous approval of a candidate is essential for the committee to recommend his advancement.

There is no uniform industry-wide plan to advance nonexempt technical employees to exempt engineering status. One problem remains: an engineer qualified as such by our committee may not be accepted as an engineer by another company. The advancement is intended to help each employee realize his fullest capabilities; if this objective is achieved, an AIL-qualified engineer may never face this problem. We hope and believe, however, that, by handling our in-plant advancement carefully, a Laboratory-qualified engineer who must leave will be accepted as an engineer elsewhere.



EXAMINATION OF CANDIDATE BY E. Q. R. COMMITTEE

CANDIDATE _____

DATE INTERVIEWED _____

BUSINESS EXPERIENCE (Include Military Experience)

CANDIDATE _____

FROM MO.	FROM YR.	TO MO.	TO YR.	COMPANY AND LOCATION	POSITION OR CLASSIFICATION

RECORD OF ACTION BY ENGINEERING QUALIFICATIONS REVIEW COMMITTEE

Distribution
Candidate
Supervisor
Wage & Salary Committee
EQRC Files

CANDIDATE

NAME _____ PRESENT CLASSIFICATION _____

SECTION _____ RECOMMENDED BY _____ SUPERVISOR

CANDIDATE'S BACKGROUND

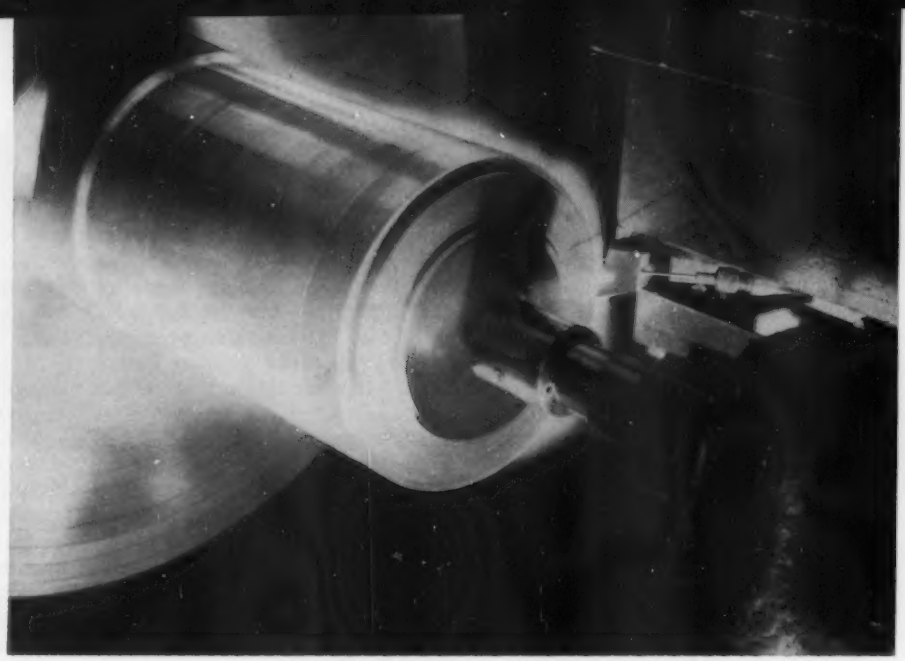
AGE _____ DATE EMPLOYED BY AIL _____ PRESENT RATE $ _____ /WK.

DATE OF APPLICATION FOR TRANSFER TO ENGINEER _____

FORMAL EDUCATION

	SCHOOL & LOCATION	MAJOR COURSE	MINOR COURSE	NO. YRS. ATTENDED	DATE OF LEAVING	DEGREE OR DIPLOMA
HIGH SCHOOL						
TRADE OR BUSINESS SCHOOL						
CORRESPONDENCE SCHOOL						
COLLEGE OR UNIVERSITY						
GRADUATE WORK						
SPECIAL TRAINING						

FORMS used to get a complete picture of the candidate's education, experience, and ambition are completed by each candidate together with the personnel department



CAPILLARY TUBE enters tool shank on side away from cutting edge, jets liquid CO_2 from coolant reservoir under tool tip to face of work. Thus CO_2 as snow in reservoir (—109 F) cools tip, then evaporates to pass through outlet(s) and cool workpiece

COOL TIP...

New English technique at last applies coolant carbide tip and orifices aimed at work, not chips.

Original application of CO_2 as a cutting fluid was, as might be expected, somewhat similar to that of other fluids—flooding the cutting area. But the cost of the gas itself, and its application on the particularly tough materials associated with the gas turbine, have suggested more selective and efficient methods of application.

Research at the Epsom (England) laboratories of Carbon Dioxide Co, Ltd, reported recently in our British compatriot, *The Machinist*, indicates that the tool tip, not the chip, should be the primary object of the jet, and secondly the work. Experimentally, Nimonic 75 has been turned at 300 sfpm, high-tensile steel at 950 sfpm, with a carbide-tipped tool, with no evidence of undue tip wear. The idea has been applied to turning of jet components in a number of plants, with increases of cutting speed of two to three times.

In contrast to previous methods, the CO_2 here is jetted through an orifice *in the tool shank*, from a reservoir bored under the tool tip. Thus the CO_2 first cools the bit, then the work, *but not the chip*. The CO_2 is refrigerated before application, so a higher percentage of solid CO_2 is formed in the jetted spray. Pressures about 200 psi above the corresponding vapor pressure of the cooled CO_2 prevents premature expansion so the CO_2 snow is formed only at the point where it is required.

why CO_2?

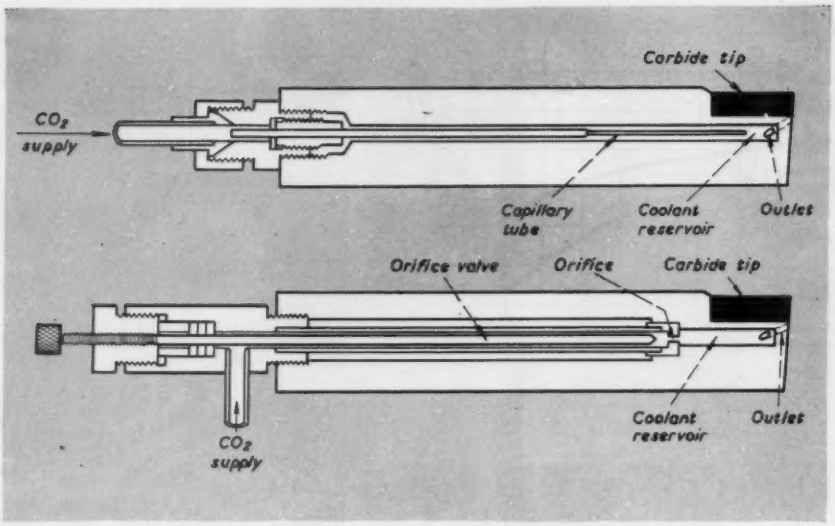
Inert gases are being used as cutting fluids because they do not contaminate lube oil, chips, or work (thus require no degreasing of work) and do not create oil fumes. They permit the operator a clear view of the work, keep tip temperatures down so tool life increases despite higher permissible cutting speeds. Cutting conditions are uniform, so surface finish is improved.

Of the well-known refrigerants, a number could give low temperatures in a closed cycle if the evaporator could be arranged within the cutting tool. Refrigerant would be lost, however, in tool changes, and toxic properties of some refrigerants would cause difficulties. Of relatively inexpensive gases which can be used expendably, nitrogen and CO_2 are the best possibilities. CO_2 has a critical temperature of 88 F, below which it can exist as a liquid, so its latent heat of evaporation is available for cooling even at room temperature. Nitrogen, on the other hand, has a critical temperature of –233 F, so would have to be supplied at temperatures below this to obtain any evaporative cooling effect. CO_2 can be solidified easily; solid nitrogen is an academic curiosity. Solid CO_2 at atmospheric pressure has a temperature of –109 F and a latent heat sublimation of about 250 Btu/lb, permitting very high heat-removal.

Previous *AM* articles on CO_2 include:

CO_2 Cools Tools—Mar 3 '52, p129

CO_2 With SiC Grinds Carbide Tools—Feb 16 '53, p172



STANDARD TOOL SHANK bored and threaded for CO_2 supply, which enters coolant reservoir under tool bit from capillary tube (upper sketch). Bore of the capillary tube, typically about 0.011 in. in dia, controls flow. To permit closer control without pressure drop and formation of solid CO_2 remote from the tool, an orifice-valve unit has been designed (lower sketch)

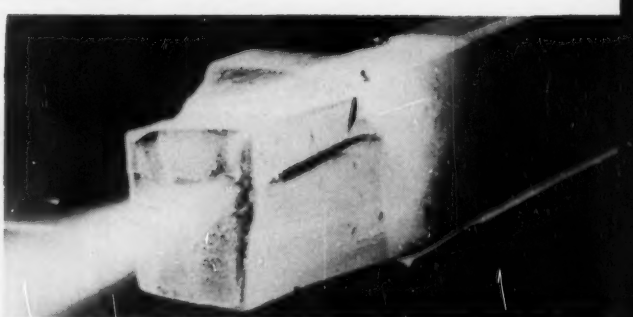
NOT CHIP, WITH CO_2

through lathe-tool shank, with reservoir under

The result is doubled or tripled cutting speeds

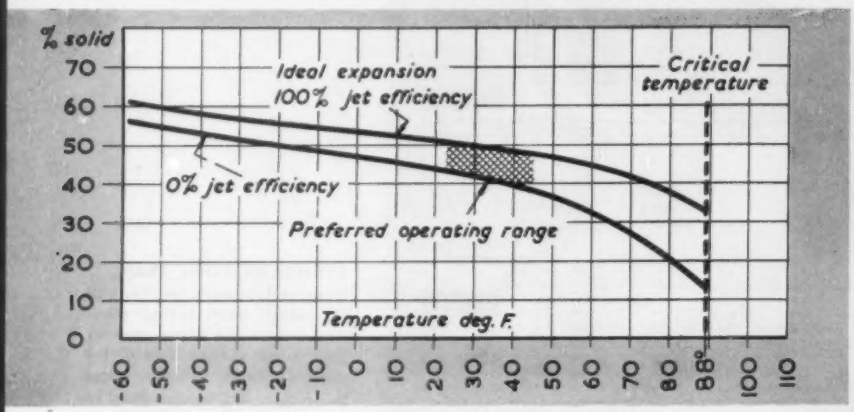
When distributed for some distance from a central storage tank, the CO_2 is not used directly from the tank, which is held at about –5 F and 290 psi by a self-contained, pressure-controlled refrigerant system. Liquid and vapor are thus in equilibrium, and there would be no reserve pressure to prevent premature solid formation of solid CO_2 in the delivery system. For convenience, the CO_2 is allowed to reach ambient temperature, thus maintaining required delivery pressure and avoiding the need for lagged piping. Pressure is raised to 900 psi by a positive pump for pipeline distribution. A small refrigerator and heat exchanger near the point of use recool the liquid.

Health hazards were found to be negligible with CO_2. The gas can rise to a concentration of 5% in the normal atmosphere without harm, contrary to popular opinion based on replacement of oxygen with CO_2, as in a fire. Here no oxygen is removed, and no deadly monoxide is formed. For example, if 50 machines in a 5000-sq ft shop, 12 ft high, were each using 10 lb of CO_2 per hr, 500 lb or 4300 cfh of CO_2 would be discharged. If air is changed at the usual six changes per hour, concentration will be about 1.2%. Although heavier than air, the gas does not settle to the floor because of drafts from moving machine parts, motors, and fans. (*next page, please*)

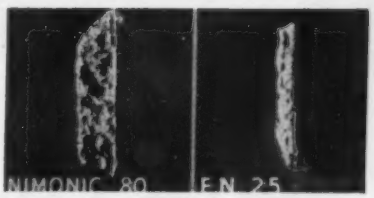


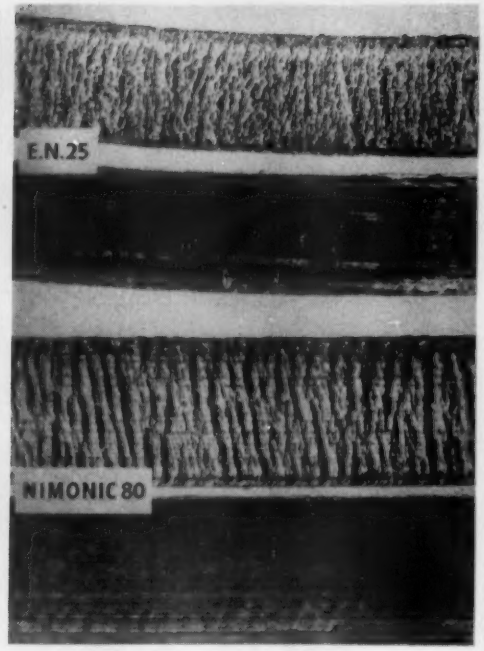
ONE OR MORE OUTLET HOLES lead from reservoir to tool face, as near as possible to the base of the carbide tip. Bits 1/16 in. thick improve results because of low thermal conductivity of carbide. Frost forming on tool indicates presence of solid CO_2 in reservoir

OPERATOR'S VIEW IS NOT OBSCURED by coolant, pipes, or nozzles, so tool breakdown, evident by deterioration of finish, is immediately evident. By holding tip temperature down, cutting rates on some high-tensile steels have been increased three or four times



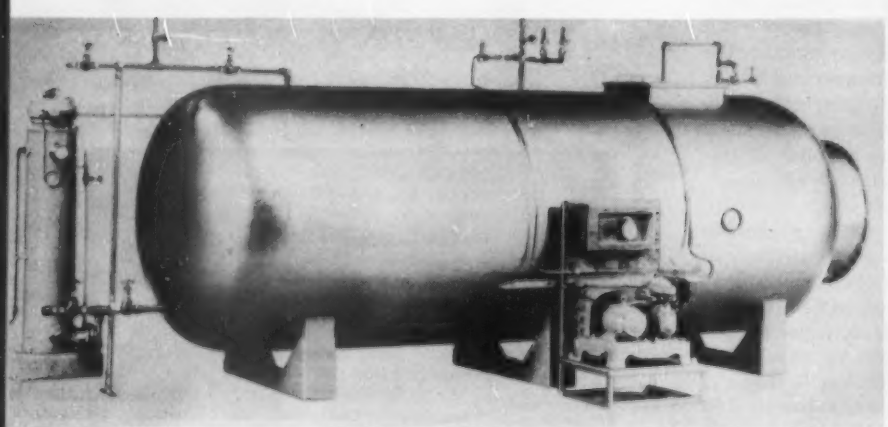
VARIATION IN PROPORTION of solid CO_2 formed by expansion of liquid delivered at various temperatures. Liquid is refrigerated to —40 F to increase snow at —109 F produced by flash evaporation. Solid CO_2 (25% at room temperature for liquid, 40% at —40 F) sublimes directly to gas, removing 250 Btu/lb from immediate surroundings

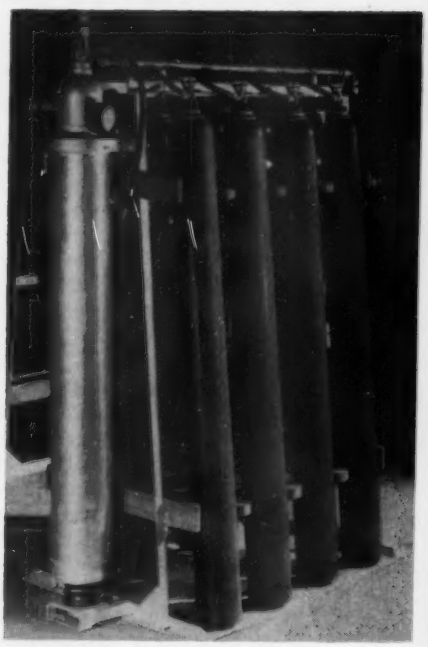




PLASTIC DEFORMATION of the metal is uniform, as shown by the compressed, corrugated outer surface (upper views) of these chips from EN25 at 700 sfpm and Nimonic 80 at 130 sfpm. End fractures (left) show plasticizing also. Chip has been softened by cutting heat, but tool tip does not crater and surface finish remains good, as shown by reverse faces of chips (below in each case)

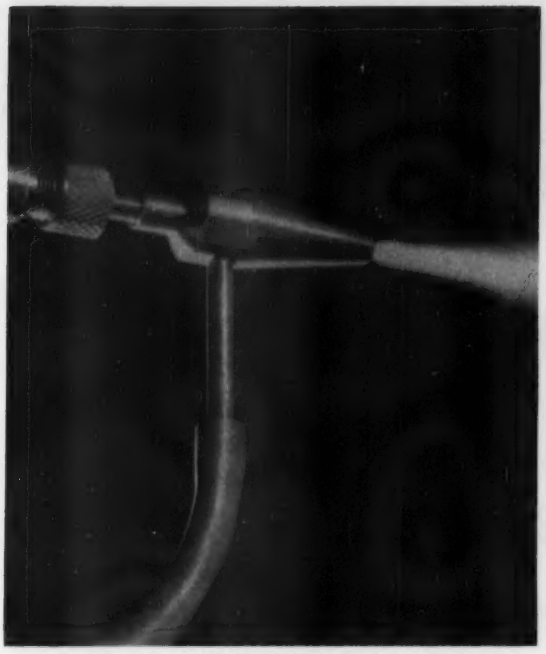
COOL TIP . . . NOT CHIP, with CO_2 . . . *continued*





LARGER PRODUCTION INSTALLATIONS are served either by a 1½-ton or a 6-ton unit like that above, with a pressure-controlled refrigerant system holding tank contents at —5 F. Such a setup can be used to refill cylinders for isolated installations as well

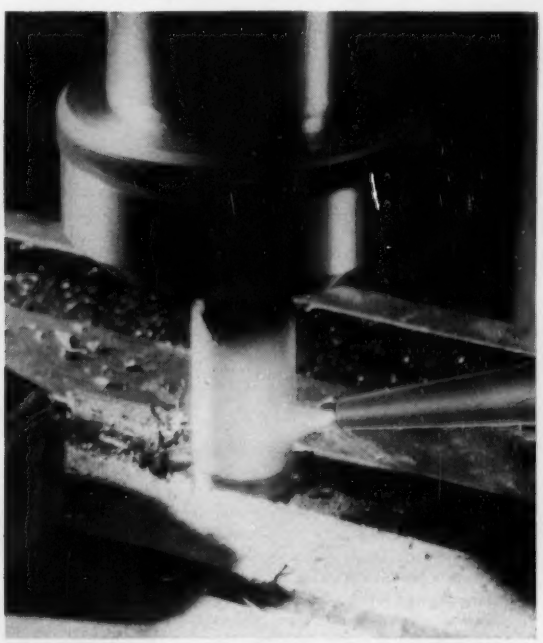
8-CYLINDER (each 20 lb) rack manifold supplies one or two machines, providing 30 lb per hr from each bank of 4 cylinders in turn. A reserve cylinder on the end is set on a spring so its decreasing weight operates a micro-switch and rings a bell. There is a built-in electric refrigerator to cool the liquid to —40 F. Delivery is at 750 to 1000 psi to prevent solidification in jets or capillaries



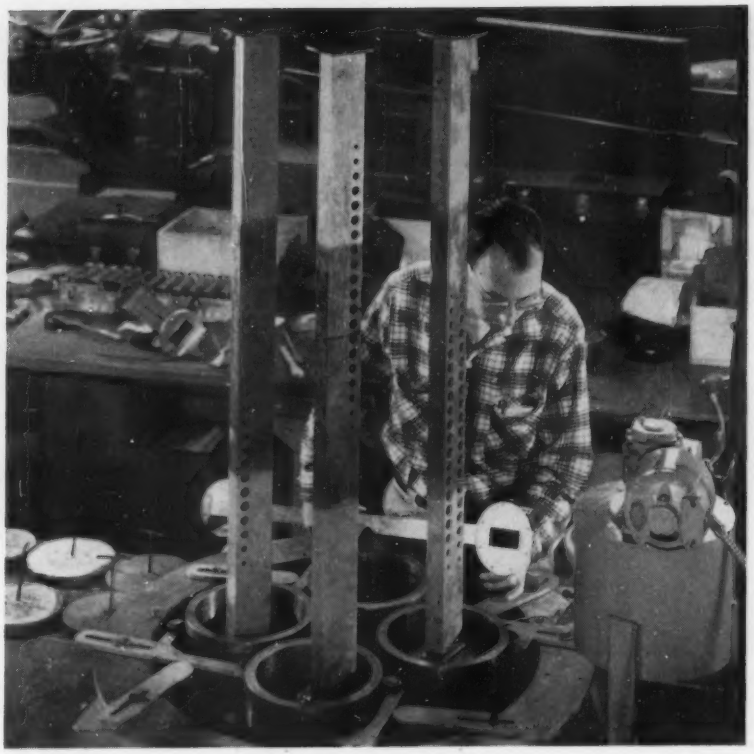
IF THE CUTTING EDGE IS HARD TO REACH, as in boring tools, light oil may be aspirated into the spray, causing the snow to be projected onto and to adhere to the surfaces. If considerable oil or air flow is necessary to wash out chips, CO_2 may be applied in addition. Both fixed and rotating connections have been developed, the latter a gland fitting

MULTIPLE JETS provide a cooled zone for offhand grinding. Coolant does not clog the wheel and the low temperature preserves the bond as well as avoiding thermal cracking of tipped tools

DRILLS ARE COOLED BY CO_2 snow close to the point of entry to prevent heating and thermal distortion of the workpiece. EN 25 about 1 in. thick has been drilled at 700 rpm with HSS drills at 0.04- to 0.08-ipr feed with negligible drill wear after 100 holes. Jobs requiring flute lubrication to remove chips are not practical



VERTICAL END MILLING offers possibilities for CO_2 cooling, because the jet can be brought close to create snow on the cutter. In surface milling, cooling effect may be wasted through the cutter and arbor, so oil is added to the jet to cause it to adhere to surfaces normally hard to reach



CRITICAL FLANGE SURFACES are finished on this plant-built lapping machine. Its 2-ft CI lapping table is concave about 0.002 in. across its diameter to make flange surfaces on wave guides and other parts slightly convex for tighter joints. Small parts are placed within a containing ring, which also continually resurfaces the lap. Operating the table with the rings in the center for a few days would make the lap convex if desirable. Abrasive is suspended in oil in tank at right, and fed by surface tension to the table via the wire. It is 250-grit Carborundum, and initially clogged the tank valve, but now revolving neoprene-rubber paddles in the tank keep it in suspension

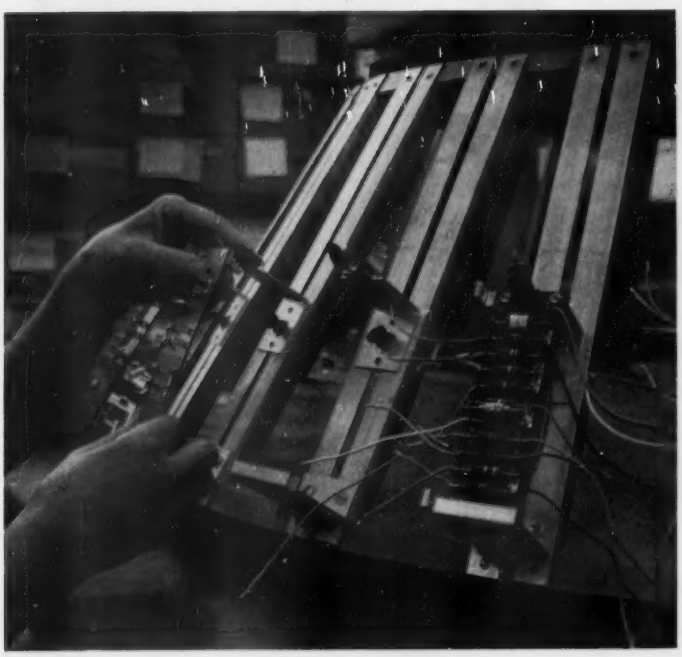
some tricks in making...

CORWIN S SELBY, Asst Production Manager, THE HEWLETT-PACKARD COMPANY, PALO ALTO, CALIF

"LAZY SUSAN" JIG holds electronic parts for soldering and assembly, cuts time 40% over individual jigs. Operator spins jig a number of times with each loading, completing like operations on each card in each circuit. Operator's job also is eased by use of goose-neck soldering iron. Closeup (adjacent photo, next page) shows adjustable spring-clamp holders. The multiple jig not only saves time but also has incentive value—the operator likes to work on it, gets satisfaction out of seeing a number of completed units instead of one at a time

SURFACES OF DIRECTIONAL couplers (right) and various wave guides are finished on 4-rpm table. At left, a 5-lb weight speeds lapping; smaller ones are rubber-banded onto couplers as counter balances. Weights over a flat sponge are also placed on groups of small parts to spread the load. Cut-out jig holds couplers in position. Radiating grooves in the table surface counter the tendency of the work to float on the oil, the groove edges forcing a cutting action. Lapping was formerly done by hand, a slow operation that didn't give flat surfaces. A new table is being built, with a 3-ft-dia table—twice the capacity

ELECTRON PLUMBING



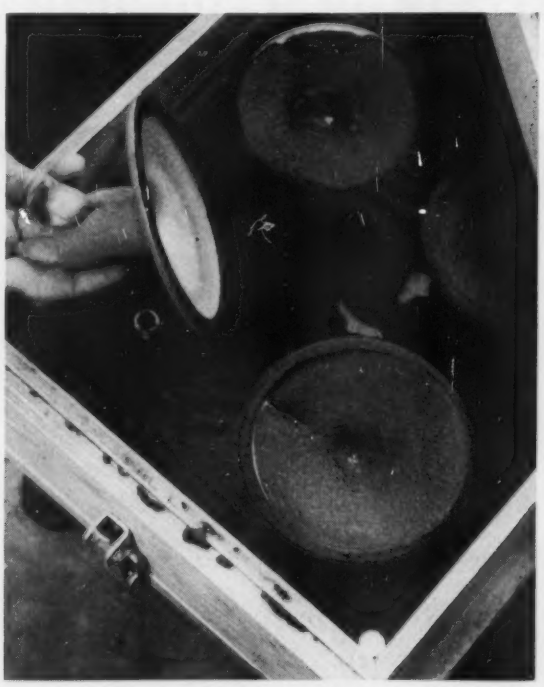
STORED DIES and small tools are protected from plant dust by plastic curtains on traverse rods. They are 8-gage vinyl sheet, made by Plastic Maid Co of California

PLEASE TURN PAGE . . .

NOTCHES—or "ears" are pulled on each corner of wave guides by four tool-steel inserts in the ear die (above), set on a hand arbor press. Notch depth is half that of the wave-guide wall. When

the wave guide is set in the flange for brazing (above) in an induction heater, the ears rest on the flange ring, holding the vertical member precisely in position

FLOCKING BASES of wave-guide stands rather than glueing on felt pads cut job time 80%. Ordinary kitchen enamel in deep green is the adhesive, applied by a silk-screen setup (upper photo). This gives a faster, evener job than hand coating. Four coated bases are



inverted on pins in a standard flocking box, are flocked for 15 to 20 sec agitation with the longest-fibered flock available (1/16 in.). The excess flock is shaken off, and the part is complete. The enamel color adds to the appearance of the flock on the finished base

American Machinist
SPECIAL REPORT
NUMBER 354

how to coordinate subcontracting to meet production schedules

GEORGE E. FOUCH,
Manager, Jet Engine Dept., Aircraft Gas Turbine Div.,
THE GENERAL ELECTRIC COMPANY, EVENDALE, OHIO

More than 4000 companies, predominantly in the "small business" category, form the subcontracting and supplier network which provides most of the components for the J-47 jet turbine. To achieve coordinated control over this vast network, GE maintains an extensive subcontracting organization. Whether your contracts are "prime" or "sub" this study should prove a valuable planning aid.

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ORGANIZE FOR FLEXIBILITY

Parts requirements, per month for the J-47 engine and spares, were determined by production planning. After evaluation, these requirements were divided into two groups. Those parts which were planned for manufacture at Evendale were released for manufacture and the remainder were requisitioned as a requirement on subcontracting. The latter then converted these requirements into a program of jet-engine parts procurement. It requested bids, negotiated purchase contracts with the subcontractors, coordinated their production and shipment, and made payment to the subcontractors for the work they accomplished. Internally, the subcontract operation was organized to render service in purchasing, engineering, manufacturing, finance, and administration. It also maintained liaison with the two automotive manufacturers who, under prime contracts, were producing J-47 engines to a GE design.

CENTRAL CONTROL

Each of the subcontractors, applying his special skills and experience, made the parts to General Electric Co drawings and shipped them according to a predetermined schedule. While some of the J-47 components could be produced by suppliers on more-or-less standard equipment, a large number of the required parts were peculiar to jet engines. These items depended upon specialized facilities or equipment, which had to be installed in the selected supplier's plant. The United States Air Force negotiated facilities contracts directly with these subcontractors.

Once these subcontractors were set up to produce special jet-engine parts, they became fixed sources for the duration of the purchase contracts. Thus, how they performed to meet GE engine production requirements from the standpoint of quality, dependability, price, and delivery became a matter of prime concern to the subcontract management. Close liaison with these fixed sources, therefore, became a necessity.

The program was organized to perform several functions, including: delivery to meet schedules, conformance to drawings, process engineering, blueprint interpretation, machine-tool utilization, materials availability, and labor-management problems. This liaison service was provided wherever there was a demonstrated need or a request for it. It was available to all of the many suppliers. Most of the problems resulted from one, or both, of two causes:

1. A supplier called for assistance because the jet-engine part being produced was different from his normal product.

2. A supplier showed indication of failing to meet his delivery promises as a result of some technical supply and equipment or control problems.

In either of these conditions, specialized subcontract personnel direct their work with subcontractors primarily to define the causes of the problem and to ascertain that corrective action is developed and implemented to achieve a quick solution. The primary objective is to insure that the collective effort of all suppliers will result in the correct J-47 parts arriving in the proper place according to specification and on schedule. That objective describes the sum and substance of the entire program.

FIELD LIAISON

To accomplish this end result, not only do managers and specialists travel from the Evendale plant on liaison missions, but a permanent installation of subcontract personnel is assigned to six field offices for the full-time work of following through on production, engineering, and inspection problems with suppliers located in their geographic areas, and reporting progress.

Subcontract management, at its headquarters in Evendale, employs a number of organization and coordination techniques to assure that their objectives are met with economy and efficiency. In very simple terms, these techniques provide a production control system designed to operate on a remote-source basis.

This system might be applied to any organization assembling a product at a central point but obtaining parts from decentralized manufacturing sources. However, at Evendale small quantities of all of the major and critical items are manufactured. Thus, a buffer is provided against slight delays in delivery and the control organization is provided with direct and immediate experience on each item.

INVESTMENT PLANNING

For the purpose of controlling investment in the inventory of J-47 components, a monetary value classification is used to place all parts into A, B, and C categories:

A items—include about 45 components of high-value-per-engine-set. These items account for about 85% of the total cost of all J-47 parts going into an engine.

B items—consist of approximately 500 components of medium-high value and account for 10% of the parts cost per engine.

C items—are the remainder, about 1200 small, low-cost-per-each parts which comprise the remaining 5% of the parts cost per engine.

Very sensitive control procedures are applied to the high-value items and their status is followed by the persons concerned in production followup on practically a daily basis. This status is reviewed and compared with the rates for assembly requirements. Efforts are directed to achieve a condition

The author, Geo E Fouch, was formerly Manager, Subcontract Operation.

THE BASIC MANAGEMENT PROCESS

1. **Determination of the Objective**
2. **Establishment of a Plan to Achieve the Objective.**
3. **Periodic Reporting of Progress against the Plan.**
4. **Analysis of Progress and Corrective Action where Required.**

GENERAL ELECTRIC COMPANY
EVENDALE, OHIO

wherein only a necessary and reasonable amount of working capital is invested in parts in finished stores ahead of the assembly line.

A number of advantages result from an inventory control which is "investment planning" conscious. Among others, these gains include:

1. minimum dormant capital
2. efficient utilization of storage space
3. reduced danger of obsolescense resulting from design change
4. smaller loss in case of fire or similar emergency
5. simpler stores management and control, including accounting
6. greater flexibility for purchaser and supplier

The direct dollar saving from this program can more than compensate for the operation of the control organization.

PRODUCT GROUPS

To establish teamwork among subcontracting purchasing, outside manufacturing, Quality Control, and Engineering, three task forces were formed within the subcontracting offices at Evendale. Sheetmetal items, machine components, and engine accessories each comprise relatively homogeneous family groups. Each of these family groups has its responsible task force made up of personnel specialized in the buying, production, process engineering, engineering, and quality control functions for its particular components.

Because these specialists are physically located in the same area, they have the potential to achieve positive and rapid communication. Thus, while teamwork is obtained within the task force of a component group, balance and coordination between these groups must also be established so that all of the jet parts to be used on each of the engine models will be received in time to meet assembly schedules.

This requirement is fulfilled by regularly scheduled weekly production coordination meetings. This weekly meeting has a definite day of the week and time; it is always held, regardless of any potentially conflicting activities. In other words, this appointment, for those people required to attend the meeting, has top priority over all other activities.

An administrative mechanism has been developed which permits such meetings to be reasonably brief, yet very effective. This objective is accomplished by concentrating on the detection, review, and analysis of those component items which are most likely, because of their non-availability, to limit the desired rate of starts of assembly of jet engines. These limiting items, expressed in terms of engine sets, are referenced to the current rate of starts on the assembly line and are translated into a "time cushion," in working days, at current or projected rates of engine starts.

EXPEDITING

A basic management philosophy underlies this technique. It is based on the concept that the achievement of the coordination process begins with a well-organized program and sound schedules for engine - component procurement. Then follows the earliest possible detection of a significant deviation from this time-phased plan of requirement which will have an ultimate effect on the timely attainment of the shipping objective. When the deviation is significant, it must be studied in detail to resolve the actual or potential problem, its possible effect on shipments of engines, and to institute a course of corrective action. By concentration on the "least-available" components, management and key specialists are bringing their talents to bear in an area where maximum return, in terms of the objective (shipments), can be achieved per unit of effort applied. On the day previous to holding the meeting, the status of the assembly line, the most limiting items, and the statistical status of performance of the various vendors supplying these components are recorded on a report form.

ENGINE "STARTS"

The meeting begins with analyzing the status of the "limiting items" for each engine or, when one component is used in more than one engine, for the combined requirements. The reference point of analysis is the actual condition of the assembly line itself as of the moment of observation. Particular stress is placed on the cumulated number of engines started in assembly to date with the current planned start-rate per day. This sets up the daily requirement for complete sets of parts. The next consideration is to translate this coverage into working days ahead of assembly starts for each limiting item. Because of the rapidity of movement within the line, there is an arbitrarily established requirement that no engine is started on the line unless there is a complete set of parts available. This eliminates a potential source of confusion and high cost which might generate through out-of-station work or last-minute non-availability of promised parts. It is obvious that

the least available required part determines the number of complete sets of parts available for engine starts.

Having established the seven most limiting items on this basis, the next step is to go into detail on the four most "limiting items" . . . who are the vendors supplying these parts; what have been their cumulative shipments to date; what is their schedule for the month; what is their promise for the month; and what do the subcontract management field personnel forecast in the way of performance, based on their detailed analysis of the production progress in each vendor's plant? This review covers both the current month and the following month. Particular attention in the analysis is paid to the progress achieved in effecting a balanced rate of flow of components in terms of their requirement. Emphasis is on availability rates versus requirement rates, to achieve a dynamic balance of input, rather than occasional static balance.

Where a problem is revealed relative to the current or continuing availability of a limiting item, the task force charged with the responsibility for this component takes steps to institute remedial action, based on two analysis perspectives: If the condition results from a cause, how may the cause be eliminated to prevent recurrence? If the condition is a cause itself, what can be done to accelerate a change in procedure or plan to prevent recurrence? The other analysis perspective has to do with the scope of control available to the detecting group. If the corrective action is within its control, they would decide on a plan of action, assigning responsibility for such a plan to specific individuals and then forecast the results to be expected from such corrective action. When the solution of the problem must depend on action from lateral or higher authority, then the limiting-item-analysis results must be quickly transmitted to that authority, setting forth the facts, conclusions and recommendations.

FUNCTIONS AND OPERATIONS OF SUBCONTRACT MANAGEMENT

Components Buying
Freight Traffic Management
Component Value Analysis
Central Purchasing Records
Materials Purchasing
Purchasing Analysis
Price Redetermination
Contract Termination
Small Business Liaison
Supplier Production Coordination
Supplier Shipment Scheduling
Machine-Tool Equipment Allocation and Expediting
Process (Shop) Engineering
Component Engineering
Quality Control
Defense Department Liaison
Other J-47 Prime Contractor Liaison
Subcontract Accounting
Budget and Expense Control
Credit and Collection
Cost Reduction
Organization Planning
Salary and Wage Administration
Office Methods and Procedures
Operation Analysis

LIMITING ITEM

Note that the statistical data relative to the limiting items presented on the limiting item form sets forth the status as of the week previous. This is deliberate. The meeting itself is not called to review status information and to determine therefrom a course of action. It is rather to review the action taken by groups and individuals having direct responsibility for such, and results obtained therefrom during the week that has elapsed since this information first became available. This is an important fundamental. The meeting itself is not to generate action, but to review the effectiveness of the action already taken. *No new action is generated at the meeting unless action already underway is found inadequate* to meet the requirement either on the basis of results obtained to date or from a judgment factor. This review is performed in the presence of top subcontract management with key personnel representing the best talents available in the specialized areas of purchasing, engineering, quality control and manufacturing. It gives the top subcontract management a chance to criticize action already instituted, to evaluate more quickly strengths and weaknesses of personnel concerned with specific problems, and furnishes an excellent training-through-participation program wherein the relatively less-experienced personnel have the opportunity to participate in discussions with the best talent available to the organization. This procedure also assures that, in the more serious problems, the best combined talents of the organization as a whole are brought to bear in developing a program of remedial action. It is at this meeting that each of the limiting items has a brief statement of the problem or problems relative to it, with what action is underway toward its solution, prepared and published on the back of the limiting item form.

AREA CONTROL

The next phase of subcontract coordination, as applied to vendors, depends upon a constant, orderly, two-way exchange of information and recommendations between the field-office personnel and the Evendale subcontract headquarters.

The final limiting item reports are sent out to the field offices. They show the statistical status of the items, statement of problems, actions being taken, by whom, and forecast of results expected. The field personnel hold similar weekly meetings in each of the zone offices. They, too, make the same approaches to analysis and action but are concerned only with those vendors in their geographical areas. The minutes of these meetings are sent to the Evendale subcontract headquarters along with order-status reports. Contained in these order-status reports are statements of problem, action, and results for specific parts on specific purchase orders which have been selected for follow-through from week to week. The basis of these selections is two-fold: First, limiting items for which there is a supplier in their geographical area; and, second, any knowledge they may have of any component which may be in short supply because of difficulty or problems encountered by a vendor, which are apparent but have not yet been reflected in an actual shortage at Evendale. In support of this program, the field personnel representing the subcontract man-

agement have been using a production balance charting technique to help resolve problems of jet component availability in subcontractor's plants. The "production balance chart" offers three potentially useful applications. It reveals the relative production balance status in a subcontractor's plant and pinpoints the vendor's areas of difficulty in meeting promised output. Second, it can help the subcontract field man to test the subcontractor's production forecast and to determine, by factual observation, whether or not a delivery promise is possible of attainment. Finally, if the vendor desires, he can maintain the chart on a continuous basis and it will afford him a very valuable tool for production coordination in his plant and assure him that full use of the resources at his disposal are being made on a continuously balanced basis.

It should be pointed out that these charts are not an end in themselves. They are merely a means to an end, and that end is to translate into a readily understandable format the basic elements of a production situation. Thus, both the subcontract management personnel and vendor personnel concerned can approach the existing situation with a common perspective and format. By determining the vendor's limiting items and the causes for their non-availability, it is possible, in many cases, to give assistance in specific problem areas so that the end result of coordinated emphasis can be placed on the solution of those problems which are retarding the attainment of both the prime and the subcontractor meeting commited schedules.

Also, there are occasions where, by accelerating activity in one vendor's plant to cover current needs, another vendor producing the same article can be provided additional time to get underway and he, in turn, can pick up the losses occasioned by the first vendor's production surge. In an operation as complex and broad in its scope as the subcontracting program at Evendale, wherein millions of separate pieces are received every month, it is obvious that some application of the plan of coordination by detection and analysis of the exceptional case must be pursued, as it would be physically impossible to follow each and every separate item as an entity in itself.

When the activities of the Evendale subcontracting operation are taken together, it can be seen that there is provided an intermediate service of teamwork between the requirements of the assembly line and the some 4,000 vendors scattered throughout the United States.

In the final analysis, any system or procedure should be judged by the results which it produces. The production record of General Electric at Evendale is positive proof that such a vast subcontracting program, with its exacting quality requirements, as dictated by the jet engine itself, is possible of attainment and is being successfully carried out.

LIMITING ITEM REPORT

The Limiting Item Report is used as an instrument of review and analysis over those engine parts which are in relatively short supply. A weekly coordination meeting is held every Thursday morning at 0930 at the Evendale subcontract office. The subcontract managers and a number of specialists in subcontract operation discuss the corrective actions taken on the limiting items during the week just past. Their purpose is to insure the adequacy of the week's actions in view of the urgency of requirements, who has responsibility over the problems uncovered, and "when" how many units of the limiting items can be expected.

The Report form consists of two sides. The front carries pertinent statistical facts to show the procurement and receipt status of limiting items, and how this compares with current production or spare requirements. On the reverse side are four groups of statements, each related to a specific item, and each recording the problems, actions, and expected results for the item. Because more than one model of engine is being assembled, one limiting item report form is made for each model combination of usage and one for each model for the parts peculiar to it.

STATISTICAL STATUS

A total of 3500 model XYZ engines has been programmed for production. At close of business Jan 15, 1953, assembly work began on the 1344th engine at a current starting rate of five engines per day. Some seven items were found "limiting." Their quantities delivered to engine production afforded shorter "time cushions" in working days prior to engine assembly. (Formula for time cushion—excess of receipts over requirements divided by the rate of starts per day minus one day for receiving and inspection.)

Elbow connector 949314 used in the forward section of Engine XYZ has appeared in Limiting Item reports a total of five weeks without interruption. Current time cushion was zero working days. Its single source, Aero Fitting, was behind schedule in shipment for January and would not come up to promises in February.

The above status review was supported by statistics on Engine XYZ, on the elbow connector, and its subcontractor.

RECORD OF PROBLEM AND ACTION

Subcontract personnel responsible for the item took steps to remedy the situation. They found that the slowdown at Aero Fitting was caused by the receipt of porous castings. Field Representative Anderson was at the plant, checking, to be sure of shipments made

subcontracting: *a special report -*

See reverse side for current problems and action underway.

LIMITING ITEM REPORT

GT-2026
SUBCONTRACT OPERATION
Reviewed and Released by
E. Hanson

For Engine XYZ (3500)

As of January 15, 1953 *Date* January 22, 1953

Reported by	No. of Engines in Assembly & Test		Work Days from Start Assembly to Acct.		Last Engine started in Assembly	Current rate per day	Scheduled Start Assembly		Engines Accepted			
									This Month to Date		Schedule	
Joe Zilch Ext. 217	Plan	Actual	Plan	Actual			This Mo.	Next Mo.	Schedule	Actual	This Mo.	Next Mo.
	195	188	21	20	1344	5	155	165	20	16	138	150

	No. of Times Rept. Consec.	Part Number	Part Name	Name of Assembly Used in	No. per Engine	Engine Sets Rec'd.		To Production			To Spares	
						Req't.	Actual	Req't.	Actual	Time Cushion in Working Days	Schedule	Actual
1	5	949314	Elbow Connector	Forward Section	1	1665	1539	1380	1349	0	285	190
2	4	728655	Chamber	Combustion Section	2	1920	1799	1380	1359	2	540	440
3	3	664387	Sector	Forward Section	4	1380	1374	1380	1374	5	0	0
4	1	802543	Turbine Casing	Exhaust Section	1	1420	1439	1380	1439	18	40	0
5	2	789756	Manifold	Combustion Section	1	1580	1629	1380	1474	25	200	155
6	3	848289	Tube	Compressor Section	2	2175	2239	1380	1479	26	795	760
7	1	949347	Housing	Exhaust Section	1	1755	1779	1380	1489	28	375	290
8												
9												
10												

#1 Vendors	Total to Date	Shipments This Month				Shipments Next Month		
		Actual to Date	Vendor Prom.	Sched.	Our Forecast	Vendor Prom.	Sched.	Our Forecast
A Aero Fitting	1539	85	150	150	125	180	170	170
B								
C								
D								
Total	1539	85	150	150	125	180	170	170

#2 Vendors	Total to Date	Shipments This Month				Shipments Next Month		
		Actual to Date	Vendor Prom.	Sched.	Our Forecast	Vendor Prom.	Sched.	Our Forecast
A Jackson	1500	30	150	150	130	170	170	170
B Roth	335	50	80	60	80	80	80	80
C								
D								
Total	1835	80	230	210	210	250	250	250

#3 Vendors	Total to Date	Shipments This Month				Shipments Next Month		
		Actual to Date	Vendor Prom.	Sched.	Our Forecast	Vendor Prom.	Sched.	Our Forecast
A Aircraft Prod.	1108	110	220	200	200	220	200	200
B Johnson	172	24	50	40	50	70	70	70
C Koll	120	26	50	40	50	60	60	60
D								
Total	1400	160	320	280	300	350	330	330

#4 Vendors	Total to Date	Shipments This Month				Shipments Next Month		
		Actual to cast	Vendor Prom.	Sched.	Our Forecast	Vendor Prom.	Sched.	Our Forecast
A J. E. P.	760	80	135	135	135	150	150	150
B National Welding	740	55	90	90	65	120	100	100
C								
D								
Total	1490	135	225	225	200	270	250	250

Backlog shown in present month schedule column only.

from new castings. The statement of this problem and Aero Fitting's remedial action were recorded on the back of the Limiting Item report. Other items were outlined in a similar manner and, where necessary, remedial action was taken by the suppliers.

PRODUCTION COORDINATION

When the coordination meeting took place Jan 22, subcontract managers and supervisors made an appraisal of the efforts in reducing the causes giving rise to the limiting items. These efforts were made during the week since Jan 15 when the statistical status of the limiting items was confirmed.

The coordination meeting occurs once a week. Each time the limiting item reports are used to provide a tool for analyzing and controlling the parts-subcontract work in support of the J-47 production.

PRODUCTION BALANCE CHART

In a subcontractor's plant, the Production Balance Chart (Sensing Device #0000) can be used for three purposes:

a. For revealing production status, it can show in a way that is easy to see how "things stand" in the process of making a jet component at any specified time. This leads directly to "trouble-shooting" before a poor condition may get worse.

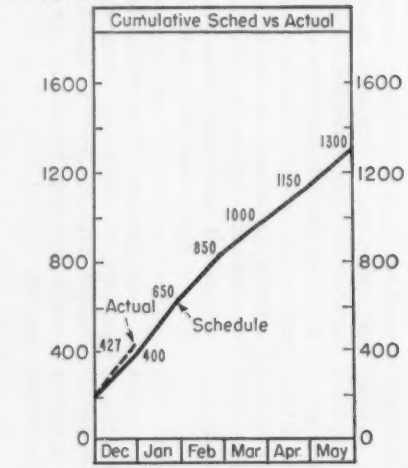
b. For forecasting production and appraising delivery promises it gives a picture of the time-phased production plan for a jet component. By relating the "status" to the "plan," a forecast can be made accurately on the quantities of a jet component (or its sub-assemblies) that would more likely be produced within a given number of working days. Meanwhile, the quantities promised by a subcontractor can be gaged in the light of his actual production ability to meet the promises. This is also done by a matching of "status" against "plans."

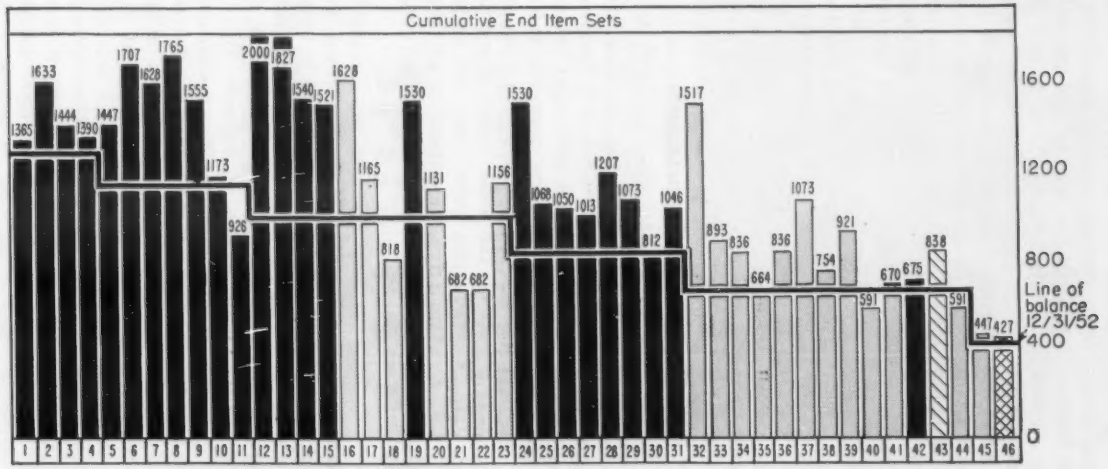
c. Continual Coordination—The production status changes with time. The production plan may be altered also by shifting and re-grouping the human talents, the material and machine resources. How future status will stand against future plans may be projected on the balance chart for continued analysis. Many a subcontractor has

SENSING DEVICE NO. 0000

Contract No. XXXX
for 2000 units

Source: X Company
Date : C.O.B. Dec 31, 1952





Purch. parts (blue)
Fabrication (green)
Assy or sub-assy (red)
Shipped (yellow)
Released for fab
Available in stores

Misc. mach pts

Misc mach pts

12 → 24 → 32 Jewel set assy 2235 AP
13 → 25 → 33 Jewel set assy 3792 JW
14 → 26 → 34 Term and holder A 7534 DR
5 → 27 → 35 Brush and arm A 1623 GC
6 → 28 → 36 Balance RS A 9214 WN
15 → 29 → 37 Support and jewel A 8987 AM
7 → 16 Plate and post A 1453 CR
8 → 17 → 38 Plate and resistor A 2673 JS
1 → 18 Resistor body and term 5263 LX
9 → 19 → 39 Case assy 1121 MM
10 → 20 Shaft and fork assy 7286 BY
2 → 21 Diaph assy 2933 CM
3 → 22 Diaph assy 6118 FC
4 → 23 → 40 Case plate and body A 3685 MG
11 → 30 → 41 Shaft assy group 1904 RR
31 → 42 Misc mach pts – final assy
43 Purch pts – final assy
Inspect
44 → 45 → 46 Ship

Reported by: D. V. Roberts

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 Work days prior to ship

found it desirable to use this technique as a basis for regularly scheduled coordination meetings by top management with key managers of specialized functions. In this case, the chart is used as a coordination control device to enable all to look at the "forest" rather than a "single tree."

Three main sections form the body of the chart. On the upper left is a boxed-in line diagram of shipments scheduled vs actual shipments. To its right is another boxed-in diagram which shows the production status against a line (or lines) of balance. In the lower half of the picture is a diagram of the production plan for Sensing Device #0000.

SHIPMENTS SCHEDULED VS ACTUAL

This sectional chart shows two lines which are drawn vertically to a quantity scale and horizontally to a time scale. The scheduled shipment line in black extends from Dec 1, 1952, through May 31, 1953. It shows, in cumulative quantities, how many of the Sensing Devices should have been shipped at the end of each month, December through May. In a similar way, the line in red for actual shipments is drawn. Here, it extends through the month of December only, showing 427 units of the Sensing Device shipped at close of business, Dec 31, 1952.

The time-phased production plan, shown graphically in the lower half of the exhibit, presents a production flow chart, showing production control points in symbols of triangles and squares. At these points, a count can be taken of the homogeneous groupings of material, parts, and sub-assemblies which are built into Sensing Device #0000. The control points are numbered in sequence from left to right and top to bottom.

The production processes are pictured between control points by colored horizontal bars. Each bar has an exact length measured off against a time scale in work-days. At the bottom of the chart, the work-day scale begins at the right with zero point for the shipping date. By the Sensing Device production plan, all subassemblies for a complete unit must be ready for final assembly 20 days prior to shipping date. Taking the Shaft Assembly, group 1904RR for example, 60 work-days are allowed for its fabrication and sub-assembly. Therefore, at control point No. 11, fabrication for the shaft group begins 80 days ahead of shipping date. Then, at control point No. 30, the sub-assembly work begins 40 days ahead in accordance with the production plan.

The *bar chart of production status* shows the production "status" as measured simultaneously at all the production control points No. 1 through No. 46. Vertical bars are drawn to scale in "engine sets" of the Sensing Device. Each bar is matched in color and in number to a corresponding control point in the production plan. The height of a "status" bar is determined by the physical count made of the cumulative "engine sets" of material passing through the corresponding production control point by a given time.

PRODUCTION STATUS VS LINE-OF-BALANCE

If production is "in dynamic balance" at all the 46 control points, the tops of the "status" bars would continually line up to form an irregular, stair-shaped "line of balance."

A fixed line of balance may be drawn for any given moment of time, such as COB December 31. It is formed by joining a series of horizontal projections across the status bars and from points on the Scheduled Shipment line.

Starting with control point No. 1, it may be seen that fabrication of Resistor Body and Terminal 5263Lx must lead shipping of Sensing Device by 100 work-days. Tracing 100 work-days after December 31 along the *Scheduled Shipment line*, a point about 1257 is reached. This means that fabrication at control point No. 1 should be started on the 1257th set after December 31 to keep the over-all production in balance.

Similarly, a point of balance can be found for each of the status bars on the *Scheduled Shipment* line, reference time COB December 31. When these points are projected horizontally across into the status bar chart and linked, they form the stair-shaped "line of balance."

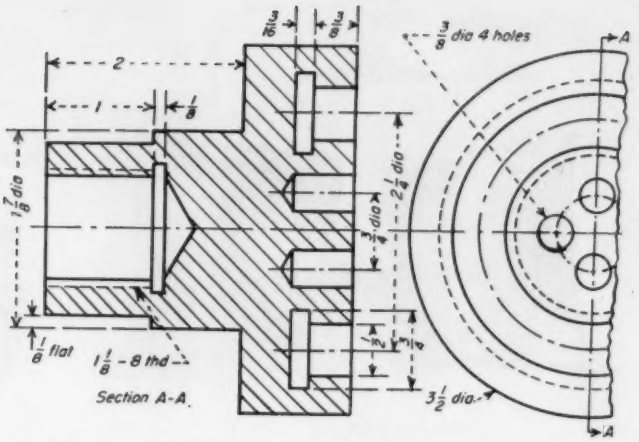
Production was behind schedule at control points 11, 18, 21 and 22, as the status chart clearly indicates. Although shipping schedule of the 650th Sensing Device can be met at the end of January, there is real question whether the end of February schedule could be met. The rate of fabricating diaphragm assemblies is a case in point (control points 21 and 22). X Company has 40 working days in which to accelerate the completion of these assemblies to the 850th set prior to March 1.

DETECTION BY IMBALANCE

By plotting some future lines of balance against the changing status bars, supervision at X Company can keep up a periodical review and coordination over the entire production plan. They can spot and act on the weak points along the production lines. They can maintain a dynamic balance at all times to meet future assembly and shipping targets.

It may occur to the discerning reader that if process times are not yet firmly established in terms of working days prior to shipment, it is difficult, if not impossible, to draw a line of balance. This is quickly conceded. It is maintained, however, if the correct relative sequence of the requirements in operations is maintained, that the slope of the status bars will give just as good an indication of relative imbalance as though it were possible to draw a more precise line of balance. Inasmuch as the status bars, by virtue of the numbering of the control points from left to right, still occur in proper relative sequence, which should produce a line of bars high on the left and receding towards the right, a marked deviation from this pattern in a positive way indicates positive imbalance, producing a questionable inventory position. A marked deviation below this normal trend signifies a lack of required availability and indicates an excellent area for more detailed analysis to determine what has caused this situation to develop and thereby retard potential rate of output.

RE-ENTRANT SHAPE produced by spinning is one with smaller diameter near the open end of the piece than at points nearer the closed end. Such shapes pose special problems in chucking



ANCHOR PLATE to hold cast chuck has annular T-slot and drilled holes to provide rigid mount for low-melting alloy cast to anchor plate

Low-melting alloys provide low-cost method to . . .

SPIN RE-ENTRANT SHAPES

When limited quantity limits chuck cost, cast alloy can be machined to shape parts that will not slip off the chuck, and the spun shell can be removed when completed by melting the chuck

DENVER SAMS and JOSEPH BORODAVCHUK, instructors, Manufacturing Processes, PURDUE UNIVERSITY, LAFAYETTE, IND

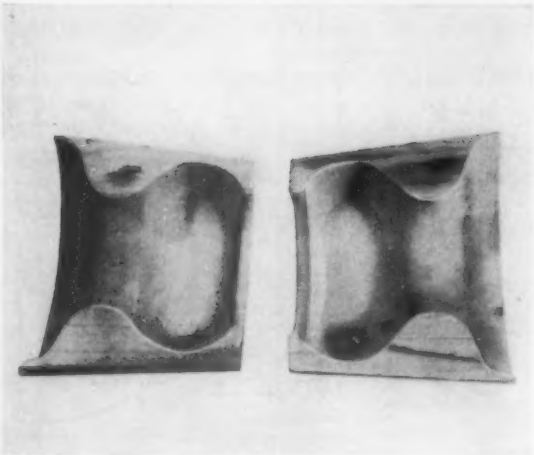
Most products manufactured by the spinning process have a peculiar shape which makes other forming methods impractical or impossible to use: a diameter smaller than some other diameter nearer the closed end of the object. A shape of this kind is known as a re-entrant shape.

Several techniques may be used to spin re-entrant shapes. The choice will be determined by such factors as the depth of the object, depth and relative diameter of the re-entrant curve, and the position of the re-entrant curve on the object. The mechanical setups for spinning re-entrant shapes by such methods as sectional chuck, split chuck, offset tailstock, and spinning in air, require skill and time, but these would be used where the quantity could justify the expense involved.

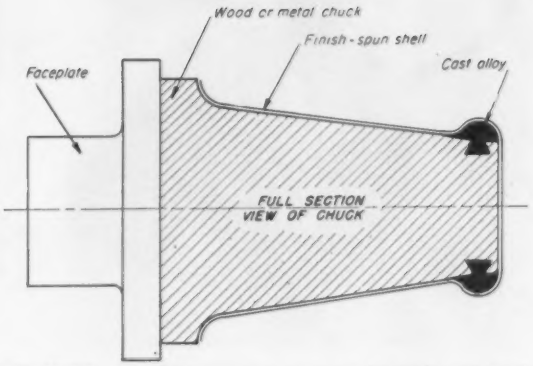
FOR CHECKING DESIGN

It may be desirable to produce a single object, or at most a very small number of the same design. The chuck for use in such a situation may be made by using Cerrobase, a low-melting bismuth alloy. With such a chuck, the spun shell is removed by melting the chuck and pouring it out of the shell. This alloy melts at 256 F, and will not anneal or otherwise affect the shell which was spun over it. Such a chuck might have limited application as a production tool, but it can be used profitably for a small quantity of parts and in experimental and developmental work. During the development stage of any new product, when it might be desirable to study this new product from the standpoint of its shape and proportion as well as its functional properties, a single specimen of the new product can be made quickly and inexpensively on a cast chuck.

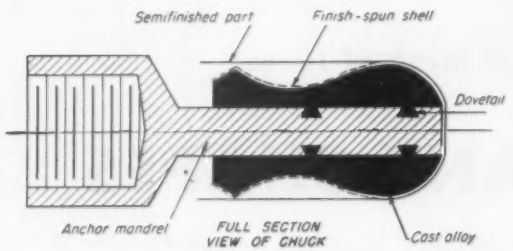
The pitcher illustrated was made on such a chuck. After it was completed, it was decided that its shape was not exactly what was desired. Better decisions of this kind can be made by studying the exact, complete shape of the finished object than by studying its curves on a flat drawing. After the final shape has been determined, the pitcher would likely be spun in quantity on a sectional chuck or by spinning in air. The use of a Cerrobase chuck in the experimental



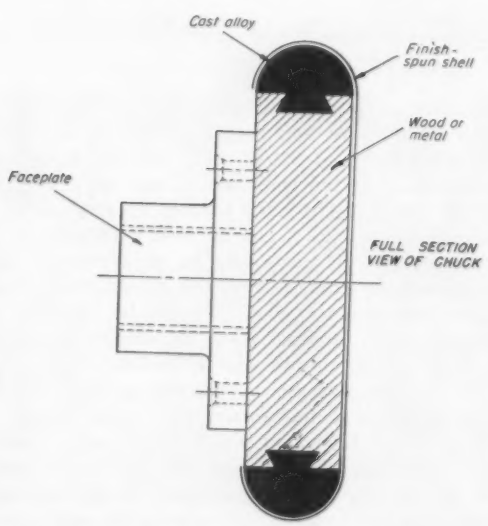
SPLIT-WOOD MOLD for casting has internal shape and size slightly larger than desired size of finished chuck. Casting is turned to size



DEEP OBJECT with slight re-entrant curve can be made with small section of low-melting alloy if no annealing of work is required during spinning operation



MANDREL FORM for anchor is preferable for deep, small-diameter work. It not only produces a stronger chuck, but reduces amount of alloy needed



SLIGHT RE-ENTRANT CURVES in shallow bowls can be made with a wood or metal chuck on which only the rim is formed by the casting alloy

stages can reduce cost and time factors appreciably.

Mounting can be accomplished by casting the molten alloy to the anchor plate in a split cylindrical mold, tapered one-piece mold, or by using a split wood mold with an internal shape and size slightly larger than the desired chuck. The most desirable method would be the one that produced a casting from which only a small amount of material had to be machined.

NO GREAT INVESTMENT

The low pouring temperature, 256 to 300 F, does not demand a great investment in furnaces or other equipment not already available to the technician. The wood mold is not seriously affected by the molten alloy, allowing repeated use.

A practical method of fastening or keying the form to the anchor plate is accomplished by turning a T-slot and drilling several holes into the face of the plate which will allow the molten alloy to flow into these recesses and solidify as an integral part of the anchor plate. This same anchor plate may be used for any shape within its size range.

If the shape is relatively deep and small in diameter, a better way to anchor the alloy is with an anchor mandrel that not only reduces the amount of alloy required for the chuck, but also increases the strength of the chuck, which is important in such small diameters.

TURNING IS EASY

Turning the chuck to the proper shape after casting is relatively simple. The same tools used for turning hardwood chucks may be used for hand turning the chucks. Heavy removal of the alloy is done best at about 233 fpm. The metal will fly off in very fine chips and will be difficult to reclaim if turned at high speeds. The final shape, where very little metal is removed, may best be turned at about 400 to 635

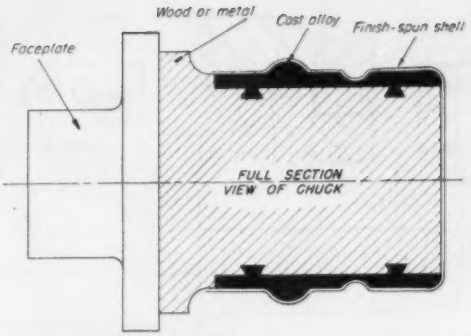
fpm. This speed is sufficient to achieve a smooth surface finish on the chuck.

Blow holes may be encountered when turning the chuck to shape. These blow holes may be patched by using a soldering iron to melt in some of the chips being turned off. The soldering iron must not be too hot, or its application to the chuck to fuse in the chips might melt a bigger hole than that being patched.

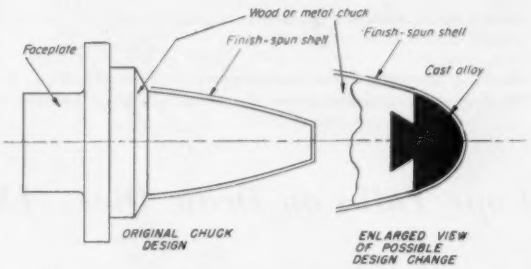
Thin metal spun at high speeds with considerable pressure might generate enough heat to cause a small section of the chuck to melt. However, such conditions will rarely combine to present this problem. Safety goggles should be worn by the spinner to prevent possible eye injury from flying hot metal, however, in case it does occur.

OTHER APPLICATIONS

There are other applications for this method, several of which are illustrated. The use of low-melting alloy for spinning chucks is not limited to re-entrant shapes. After the initial anchoring and pouring equipment has been assembled, solid chucks of any shape may be prepared and used repeatedly. When a chuck is no longer needed, it may be melted and recast to some other desired shape. Such practice can achieve the smooth internal finish of a steel chuck without the expense and delay commonly encountered when steel chucks must be made outside the spinning shop.



REINFORCING OR STIFFENING BEADS can be spun with a thin cylinder of alloy cast on the chuck and turned to the desired shape



SLIGHT DESIGN CHANGES can be made by altering chuck design with a cast section anchored to original chuck. Where no re-entrant shape is involved, altered chuck can be used repeatedly

CRATERING MAIN CAUSE OF TOOL FAILURE IN MACHINING TITANIUM

Tool failure when machining titanium alloys generally results from excessive cratering on top of the tool, according to Carboloy Dept of General Electric. This effect can be reduced by selection of the proper grade of carbide.

The low modulus of elasticity of titanium may cause chatter or vibration of the work if it is not rigidly supported. One way to get around this is to hone a 45° land on the cutting edge 0.005 to 0.010 in. wide. If this does not eliminate chatter, it may be necesary to reduce the feed.

When hardness of the work is above 37 R_c, tool life may be expected to drop sharply. When carbon content is more than 0.2%, tool life is reduced by the formation of titanium carbides.

Coolants of the synthetic emulsion type are beneficial. Best results are obtained when the tool is flooded not only from the top and side, but also from bottom.

For alloy forgings, a carbide grade similar to 44A should provide good tool life on the oxide scale. For more severe cases a special grade like 55A is recommended. Nose radius should be as large as possible, though to reduce chatter it may have to be as small as 1/32 in. This tool should run at 50 fpm with 0.010- to 0.020-in. feed, and ¼- to ½-in. depth of cut.

When there is no scale involved in roughing, a carbide grade like 883 provides fair tool life at 150 to 200 fpm with feeds from 0.010 to 0.020 ipr and ⅛ to ¼-in. depth of cut. Successful tool designs are: 5 to 7° side rake, 0 back rake, 45° side cutting edge angle, 5° end cutting edge angle, 0- to 1/64-in. nose radius and 10° relief on side and end; a triangular insert with ⅜- or ½-in. inscribed circle; or a round insert of ½-in. dia.

TURNING AND BORING

For finish turning, boring, and facing, a carbide grade like 883 or a special grade like 999 gives good results at 300 fpm. Insert tools or others with similar negative side rake are used at 0.005- to 0.010 ipr feed and 1/64- to 1/32-in. depth of cut.

Milling seems to work best with a grade like 883 at 350 sfpm at a feed of 0.003 ipt in a climb milling operation. Milling is best done without coolant, with 0 rake angle, and a 45° lead angle.

The same procedures are recommended by Carboloy for commercially pure titanium, except that speeds are approximately doubled.

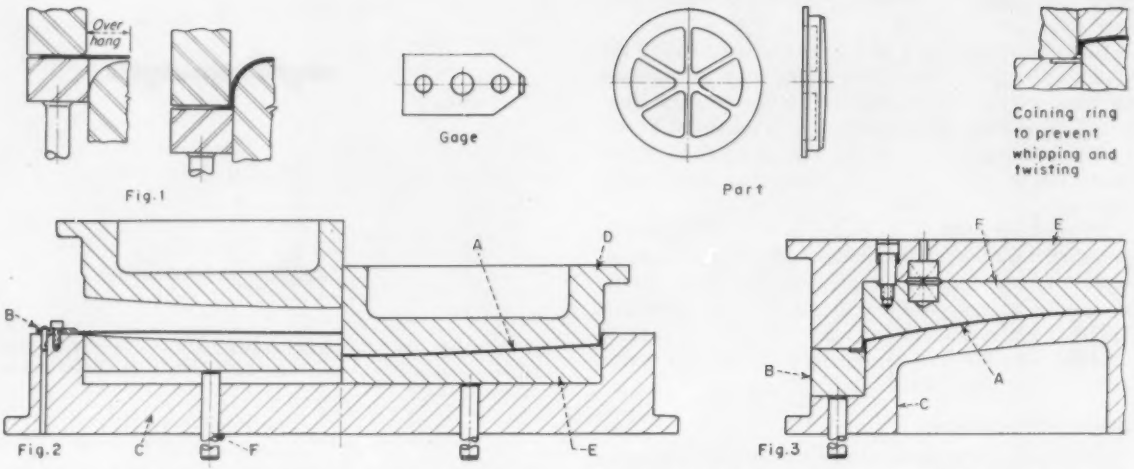


FIG. 1 . . . Overhang of the blank promotes wrinkles. **FIG. 2 . . .** For a shell with a very shallow spherical bottom, the blank is merely stamped. **FIG. 3 . . .** For a deeper dome, the blank is gripped between a pressure pad and die before drawing commences, to avoid wrinkles

Cope Talks on Draw Dies...IX

KNOW THE WRINKLES ABOUT

Spherical and oval shells are difficult to draw without wrinkles. But once you know the rules

Spherical and oval shells are often difficult to draw without wrinkles because of overhang in the die (Fig. 1), and the tendency of the metal to flow too rapidly. Two factors cause rapid metal flow: (1) the pulling power of a spherical, or ball-shaped, drawing punch, and (2) the punch and die have no side walls to act as orifices and offer resistance to flow.

Very little pressure is required to draw spherical work, but the blank-holder or pressure pad must be able to supply high pressure, if these are depended upon to keep the shell free of wrinkles. Ordinarily, you cannot depend upon the blank-holder entirely, unless the shell is shallow or the stock is thick, because the metal must flow at the right speed and quantity to draw a perfect shell.

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It is not always possible to control the flow of metal simply by applying pressure. Frequently, when a certain pressure is applied, the metal will wrinkle; and when the pressure is increased slightly, the blank will be clamped too tightly and the shell will break.

To determine whether a spherical shell can be produced by ordinary drawing methods without wrinkling, four points must be considered:

1. Height of crown
2. Diameter of shell
3. Thickness of stock
4. Width of flange

A full hemisphere is the most difficult shell to draw without wrinkles. It can be drawn to a diameter equal to 80 times the stock thickness in an ordinary drawing die equipped with a pressure pad. This diameter can be proportionately increased as the height of the shell is decreased. For example, a full hemispherical shell made from 1/32-in. stock can be drawn to a diameter of 2½ in. or a height of 1¼ in. If the shell has a spherical dome and is drawn to half the height, or ⅝ in., it can be drawn to a diameter equal to 1½ x 2½, or 3¾ in.

If the spherical dome of a shell is very low, it may be drawn without pressure in a die similar to that shown in Fig. 2. Blank *A*, previously cut to the correct diameter, is placed in a nest formed by gages *B* (one shown) and rests on die *C*. When the slide descends, the spherical bottom of the shell is stamped between punch *D* and *E*. Pad *E* is normally held flush with the top of die *C* by pressure pins *F*. Continued descent of the slide causes pad *E* to descend and the small flange to be formed over die *C*.

When the spherical bottom is more pronounced, it must be drawn in a die like that shown in Fig. 3.

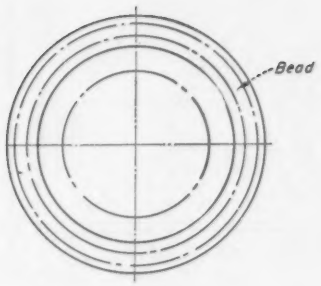


Fig. 4

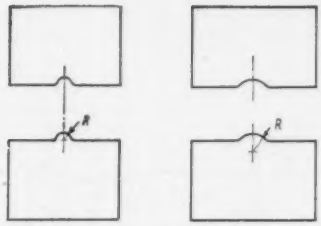


Fig. 5 Fig. 6

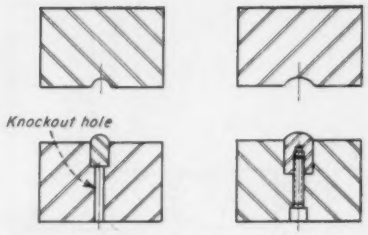


Fig. 7 Fig. 8

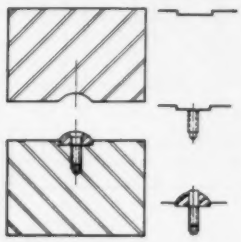


Fig. 9

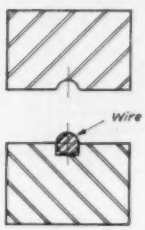


Fig. 10

FIG. 4 . . . A draw bead can be used with round or square blanks. FIGS. 5 to 10 . . . Draw beads may be machined in the die, provided as inserts, or made from wire welded or fastened in a slot

SPHERICAL SHELLS

STANLEY R COPE, President
ACME SCHOOL OF DIE DESIGN ENGINEERING, SOUTH BEND I

and suitable die design, such work should no longer prove troublesome

With this die, blank *A* is placed in a shallow nest in pressure pad *B*. Pad *B* is normally held flush with the top of the drawing punch *C* by pins *D*. When the slide descends, die *E* grips the blank and prevents wrinkles from starting at the edge during the drawing operation. The shell is struck all over at the bottom of the stroke. When the slide ascends, pad *B* strips the shell from the punch, and spring knockout plate *F* ejects it from the die.

Shells with high domes or high flanges are blanked and drawn in combination or double-action dies.

SPRINGBACK

Shallow shells with spherical bottoms and short flanges, similar to those shown in Figs. 2 and 3, will spring back considerably after release from the die. To produce them to specifications, the flanges must be drawn to a larger diameter, and the shells drawn as much as ½ in. higher than the finished shells.

Shallow, spherical shells also have a tendency to whip and twist —the bottom of the flange will rest only on three or four points. Whipping can be prevented and springback reduced by coining a small groove inside the shell near the flange. The groove should be 1/16 to ⅛ in. wide by a few thousandths deep.

When the metal is too thin in relation to the shell diameter, or the dome is so high as to prevent drawing by conventional methods, one of the following means must be used:

1. Oversize blank.
2. Draw beads.
3. Two-piece punch.
4. Stretch to final shape from straight-walled shell.
5. Redraw and stamp the final shape from straight-walled shell.

OVERSIZE BLANKS

Wrinkles can be avoided by using an oversize round blank or a square-sheared blank. The extra width of flange provides more gripping surface to retard flow of metal. Square blanks do not draw in evenly. They must also be oversize to prevent the shell from wrinkling and puckering in the four places nearest the edges. Both methods waste metal and increase the cost of the stamping.

DRAW BEADS

Draw-beads are narrow, rounded projections that protrude above the blank holder. Flow of metal over the beads can be retarded by any desired amount, depending upon the size and number of the beads.

Beads are generally located a short distance from the outer edge of the flange, they face in the same direction as the drawn portion of

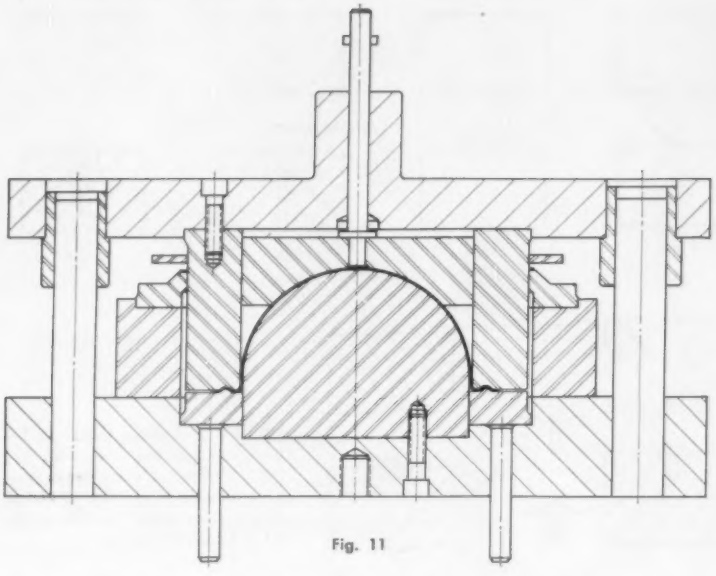


Fig. 11

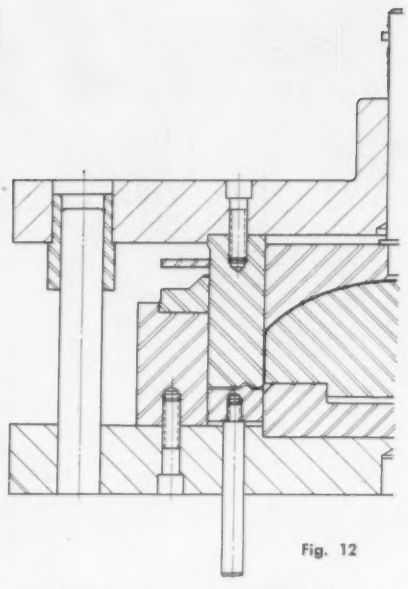


Fig. 12

FIG. 11 . . . A draw bead surrounding the periphery of the shell, and close to it to save metal, is required when drawing a hemispherical shell. **FIG. 12** . . . The draw bead is necessary while drawing the dome but not the straight shell wall. Hence the blank edge leaves the draw bead and is pinch trimmed

the shell, and they follow the shell contour. For round work they should surround the entire periphery. For non-round work they should be placed only where needed; that is, along the curved or spherical sides of the shell.

You can use beads with either round blanks (Fig. 4) or square-sheared blanks. Square-sheared blanks provide extra gripping surface, and avoid blanking rings in the die, but must not be used for deep shells. The metal does not flow evenly and the shell will pucker badly or break.

Size of Draw Beads—Beads are made 3/16 to ⅜ in. wide and 1/16 to 3/16 in. high, depending on the size of the die and the shape of the shell. Small beads usually form a complete half circle, Fig. 5, whereas larger beads are only a segment, Fig. 6.

For drawing round shells, beads are usually machined on the pressure pad from the solid. Straight or curved beads are usually made in separate pieces. They may be press fitted in milled slots, or retained by screws, Figs. 7 and 8, but in the most common method, Fig. 9, the beads are retained in slots about 1/16 in. deep by studs riveted over and filed smooth.

Small Beads — Straight, curved or circular—can be made by machining a groove in the pressure pad and inserting round wire, Fig. 10. One-half of the wire is allowed to protrude above the pressure pad. The wire may be either welded in place or fastened with studs.

For low-production requirements, where the pressure pad is cast from iron or Kirksite, beads may be cast on the pad and finished by filing and scraping. Another method is to build up a bead with welding rod and machine it to the correct contour.

Ordinarily it is advisable to machine the die groove above the bead to conform with the shape of the bead. This arrangement provides additional friction to retard flow of metal, although plain slots are frequently used. Beads in production tooling are subject to excessive wear and should be made of hardened tool steel.

Number of Beads—Single draw beads are usually sufficient to prevent wrinkles, but double and even triple beads are used. If a bead is too high, the metal may become strained by excessive localized flexing. Moreover, it may be difficult to stamp high beads in the flat sheet. If wrinkles form while the beads are stamped, they cannot be removed. To avoid this condition, two or more low beads should be used instead of one high bead.

APPLICATION OF DRAW BEADS

A hemispherical shell is blanked and drawn in the combination die shown in Fig. 11. The bead is machined from the solid on the draw ring, and a mating groove is machined in the upper drawing die.

In most cases, it is not advisable to allow the metal to leave the beads near the end of the draw. Hence, extra metal must be allowed when the blank is developed.

Another round stamping with a straight wall and shallow spherical dome is blanked, drawn and pinch trimmed in the die shown in Fig. 12. A bead is required to prevent wrinkling while the spherical bottom is drawn, but is not required while drawing the straight portion. Therefore, no extra metal is allowed on the blank, and the blank is permitted to leave the bead.

TWO-PIECE PUNCHES

Certain kinds of shallow spherical shells made of thin metal can be drawn in one operation without wrinkles by employing two-piece drawing punches. The outer por-

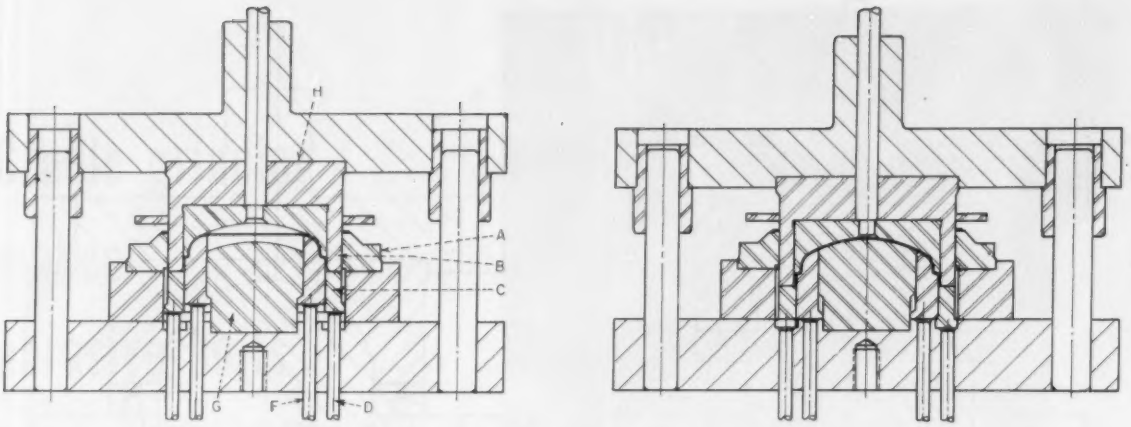
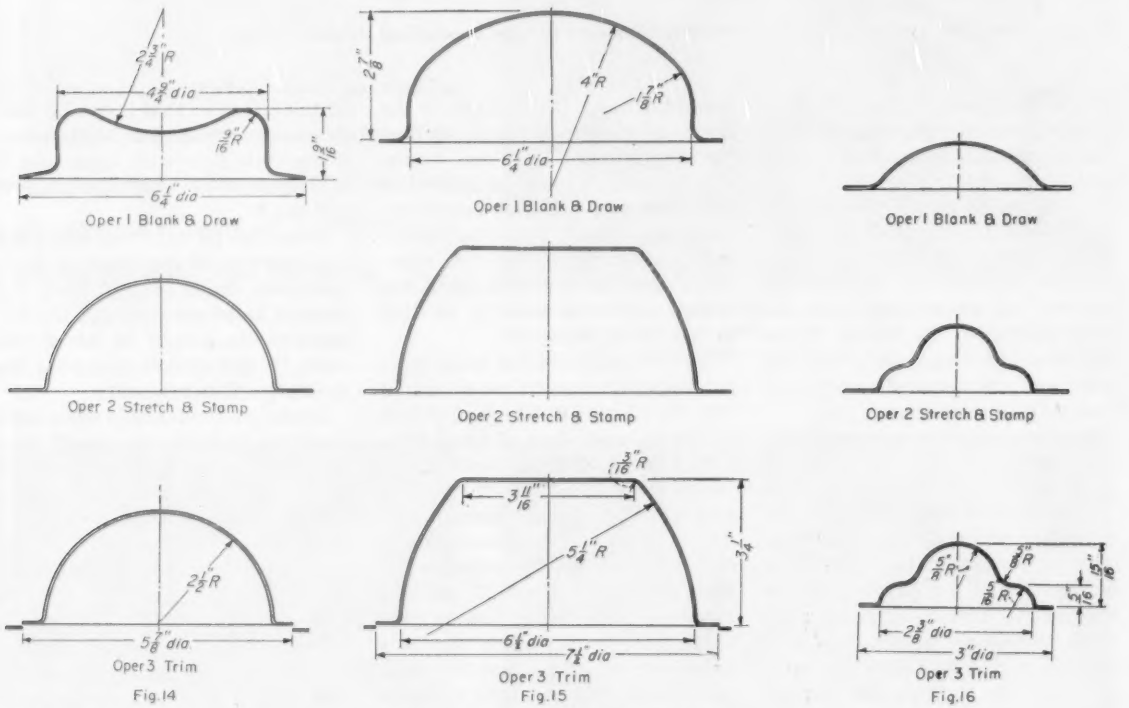


FIG. 13 . . . Two-part punch, consisting of members E and G, is actuated in timed sequence by two separate pressure pads. Material is first blanked, then partially drawn (first view), and finish drawn (second view)



FIGS. 14 TO 16 . . . Operation layouts for typical 2-operation shells show how stretching is applied to produce the final shape, when draw beads or two-piece punches cannot be employed

tion is drawn and then gripped tightly while the center, or the remaining portion, is stretched to shape. By this means the spherical dome on the punch is prevented from pulling the metal in too fast and causing the shell to pucker and wrinkle.

The die shown in Fig. 13 is used in a single-action press. The blank is cut to correct diameter by rings *A* and *B* and is confined between the upper cutting member and draw ring *C* in the same manner as an ordinary combination die. Draw ring *C* is normally held flush with the top of blanking ring *A* by pressure pins *D*. Continued descent of the slide causes the blank to contact ring *E* (outer portion of drawing punch) and be pulled from between the confining surfaces into the shape shown in the first view. Ring *E* is supported by pins *F* and

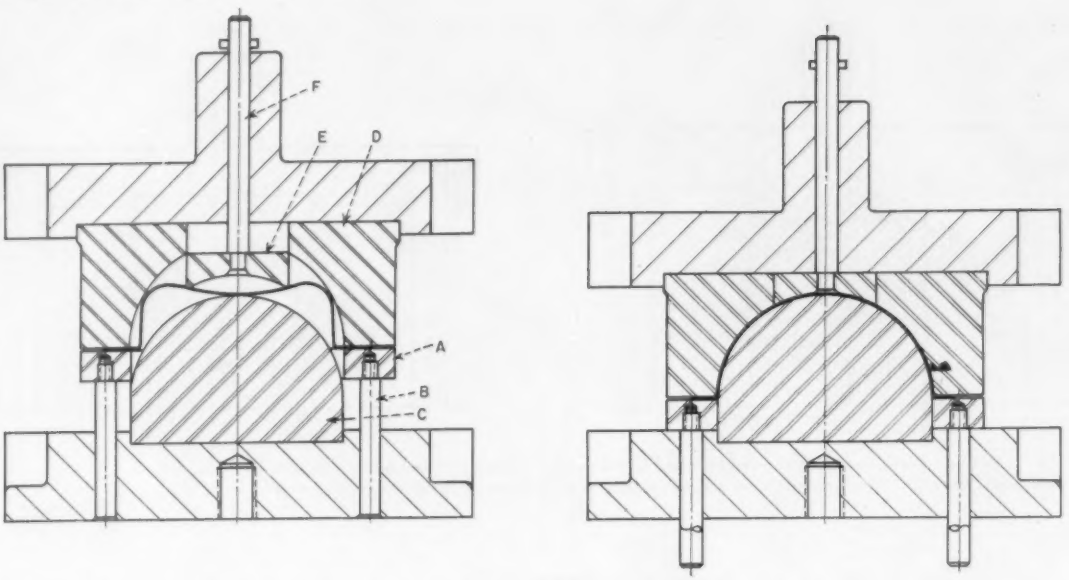


FIG. 17 . . . Shell from operation 1, Fig. 14, is first turned inside out and then stretched and stamped to shape

remains flush with the top of punch *G* during this operation. The drawn, or outer portion, of the shell is then held tightly while ring *E* is forced down to permit punch *G* to stretch the center portion of shell, as shown in the second view. Two separate pressure devices are required to operate the draw ring and the outer portion of the punch. These devices are arranged one above the other and are fastened to the bottom of the die holder.

Double-action dies operate on the same principle, but are arranged to be used in a double-action press.

Single-action dies are preferable to double-action dies for this type of work, because more pressure can be supplied by a separate pressure attachment. Double-action dies depend entirely upon springs to support the punch ring until the outer portion of the shell has been drawn. Before either type of die is designed, you must first ascertain if sufficient pressure can be made available. The pressure back of the rings must be considerably greater than that required to draw the work.

DRAWING IN TWO OPERATIONS

Draw beads and two-piece punches are not always satisfactory for drawing spherical work. Draw beads make the punch pull harder, and if the metal is very thin, or the height of the shell exceeds ½ D at the open end, the shell may break, if an attempt is made to draw it in one operation. These conditions make it necessary to produce shells in two operations. Also, two operations may be required when the drawn portion is small in relation to the OD of the shell.

Operation layouts for three typical 2-operation shells are shown in Figs. 14, 15 and 16. The shell shown in Fig. 14 is one-half of a ball float, drawn from a copper blank 7 3/16 in. in dia by 0.007 in. thick. The first operation shell is blanked and drawn in an ordinary combination die. The shell is then placed in the die shown in Fig. 17 and is stretched and stamped to its final shape. Draw ring *A* is normally held in a raised position by pressure pins *B*. The pins hold the draw ring just high enough to permit the shell to be centered in the die over punch *C* and lie flat on the draw ring. When the slide descends upper die *D* grips the flange tightly against the top face of the draw ring. Continued descent causes the draw ring (clamping ring in this case) to be pushed down. The top of the shell is turned inside out and the shell is stretched and stamped to size and shape. When the slide ascends, draw ring *A* lifts the shell off the punch so that it can be easily removed from the die by hand. If the shell rises with upper die *D* it is ejected by knockout plate *E* and rod *F*.

There are no hard and fast rules for determining the shape of first-operation shells, except that the areas of first-operation and the finished shells should be about the same. Do not stretch or expand the shell more than necessary.

Shells are stretched in the second operation to produce a smooth surface and to permit clamping the flange of the first-operation shell tightly before stamping it to its final shape. If the shell is not clamped tightly, it may buckle and wrinkle.

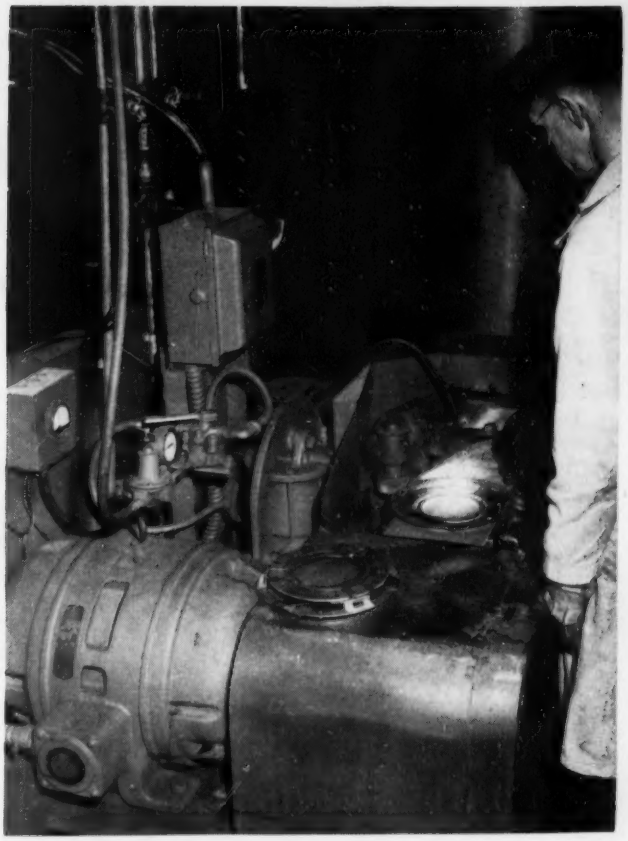
Shells are stretched enough to increase their diameter as much as 3/16 to ½ in., depending upon size and shape. It is not advisable to stretch a 2-in. dia. shell more than ¼ in. Shells over 5 in. in dia may be stretched ⅜ to ½ in.

The shell shown in Fig. 16 is not stretched to final shape, but must be made in two operations because of the large blank. To draw the shell in one operation would exceed the ultimate tensile strength of the metal. The shell is blanked and drawn in a combination die, and is then reduced and stamped.

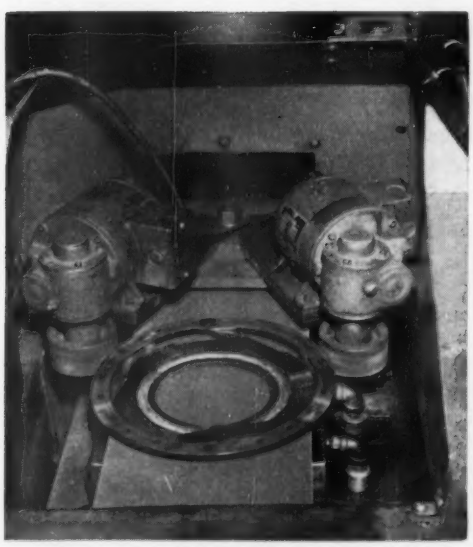
Part X will appear in an early number.

Cradle grinding makes abrasive belts more automatic

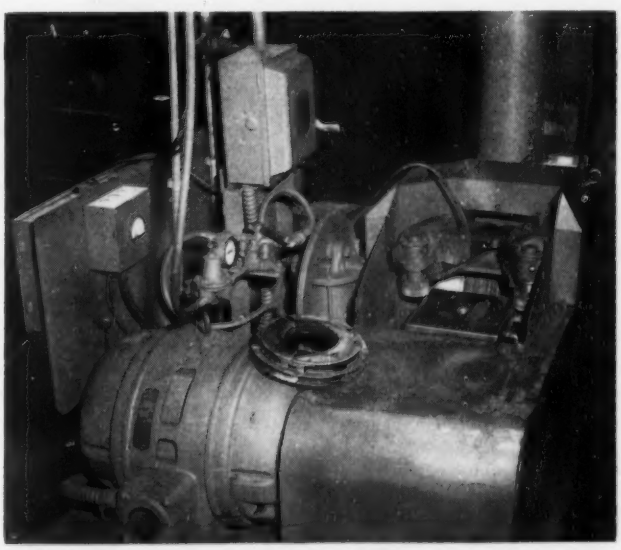
Electromagnetic platen and positioning rollers hold automotive brake disks on abrasive belt for finishing operation. Only work required of operator is inserting and removing the disks from the fixture



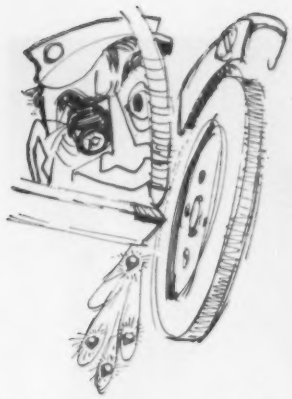
BELT MACHINE WAS EQUIPPED by engineers at Behr-Manning Corp, Troy, N Y, to retain workpiece during complete finish-grinding cycle. Fixture construction is simple and informal—similar rigs can be shop-built for similar purposes



WORK IS ROTATED TO EVEN FINISH and metal removal by electric-motor-powered rollers. Belt motion pushes work toward rollers so work cannot become disengaged



MAGNETIC PLATEN HOLDS WORK on belt and provides correct amount of normal pressure for the job. To change pressure, different-size platen can be installed, or field in electromagnet can be adjusted



why line your sludge tank

...electrolytically-assisted carbide grinding cuts

DR N W THIBAULT and B H ANDERSON, Research and Development Department, NORTON CO, WORCESTER, MASS

Three important factors had to be taken into account before any recommendations could be made for electrolytic grinding of carbides on a production basis—(1) tool performance as affected by slightly eroded adjacent cutting edges, (2) field experience data on rate of cut and diamond consumption, (3) danger of possible toxicity. Results of recent tests have established these advantages and disadvantages:

ADVANTAGES

Much less diamond used. In every case, diamond savings have been between 63 and 93%, average close to 75%, for production rates equal to or not more than 10% slower than conventional grinding.

Less dressing and truing of wheel. Dressing of the metal-bonded wheel by means of a stick or by reverse current is seldom required when sufficient current density is maintained. Because of this and the low wheel wear, the metal wheel holds its shape longer.

Better surface finish on tool. Using a 120-grit metal-bonded diamond wheel, a mat finish is produced with a surface roughness generally less than 10 mu in. rms.

Tool performance. There is neither advantage nor disadvantage in this respect. Tests indicated the same performance for tools ground conventionally and electrolytically, when cast iron or steel was being machined.

DISADVANTAGES

Capital expenditure. The electrolytic method requires alteration of a standard carbide grinder and the addition of a suitable power supply, or the purchase of a packaged unit incorporating the necessary elements. In either case, cost would be several hundred to a few thousand dollars higher than for a suitable carbide grinder alone. Under present conditions of supply and cost of diamond wheels, where carbide tools are sharpened continuously, this capital expenditure would be inconsequential.

Higher power requirements. It was estimated that the electrolytic method used 1 to 1½ times the power required for conventional grinding on the same machine. Because at least 50 or 60 average-size tools can be ground per hr, the added power cost per tool is insignificant.

Greater hand pressure. Higher contact pressures are ordinarily required to maintain the same rate of production as conventional grinding with a vitrified-bonded diamond wheel.

Operator attention to power supply. There is a need for some operator attention to power supply to maintain optimum current density. In particular, it is desirable to adjust the voltage downward when small radii are ground on large tools. The latest power supply incorporates a foot switch which permits rapid and easy change in current density under such conditions.

Non-uniform finish. The electrolytic method may give a non-uniform finish, part of a given surface being more mat than another. However, this is a factor of appearance, not quality, and has no bearing on the performance of the tool.

Spray from grinding. This method requires a sufficient flow of the electrolyte to maintain a continuous film between carbide tool and grinding wheel. Some operators object to this spray.

GRINDING SETUP

For grinding comparisons, a Norton No. 2 Bura-Way tool grinder which assures exact tool form duplication by precise mechanical means, was converted for electrolytic assistance. It was equipped with a tilting table and a universal tool holder containing a protractor and a specially constructed templet. The cartridge-type wheel spindle was insulated from its housing by non-conducting sleeves. Direct current was supplied by copper-oxide rectifiers, whose secondaries were connected in series to supply 0-24 volts, max current rating being 230 amp. External resistance could be varied in nine steps from 0 to 2.61 ohms. Current was supplied to the insulated spindle by means of carbon brushes located at the rear of the machine. In normal operation, the diamond wheel was negative, carbide tool positive, with means provided for reversing polarity for electrochemical dressing of the wheel when required.

with diamonds?

diamond consumption 75%

Electrolytically-assisted diamond-wheel grinding continues to show promise as a commercial method for sharpening single-point carbide tools without sacrificing tool performance. (AM—Nov 10 '52, p154 and Sept 28 '53, p122). Latest tests at Norton and other plants were with standard N-grade metal-bonded diamond wheels, with electrolytic assistance about 250 amp per sq in.

The power supply was assembled from readily available parts. It was purposely built with a high current-carrying capacity and with a large number of resistances to make it as flexible as possible for experimental use. Power supply in photo 1. is a later development.

To gather field experience data for rate of cut and diamond consumption, arrangements were made with a large automotive concern in Detroit to grind its carbide tools with the Bura-Way grinder. This plant was selected because it had a large number of similar production tools available for regrinding. Here are the results obtained from the grinding operations, which were jointly supervised by personnel of both concerns:

SETUP FOR ELECTROLYTICALLY-ASSISTED GRINDING

Diamond wheel: 7x¾x1¼ in., Type D6WHC-Norton D120-N50M solid metal back

Electrolyte: Socony-Vacuum rust inhibitor "A" diluted with tap water 1:20, flow rate ¾ gpm

Carbide: Wesson WS or equivalent

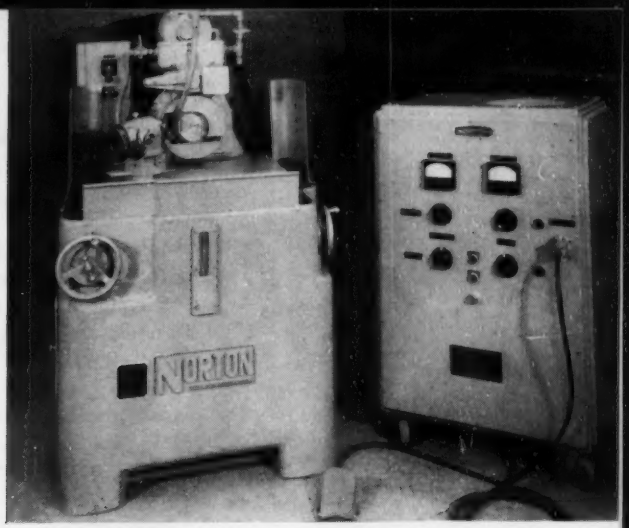
Spindle speed: 3500 rpm, peripheral wheel speed 6200 sfpm

Wheel face runout: 0.001 in. max

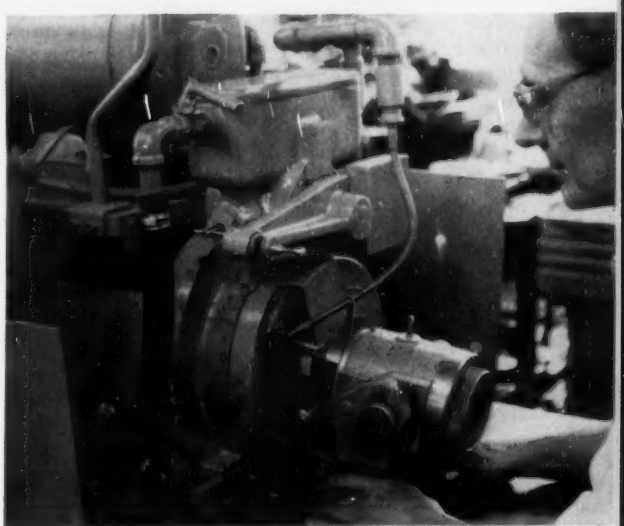
Tool contact area: 0 to 0.20 sq in.

Contact Force: 8-10 lb, manually applied between wheel and work

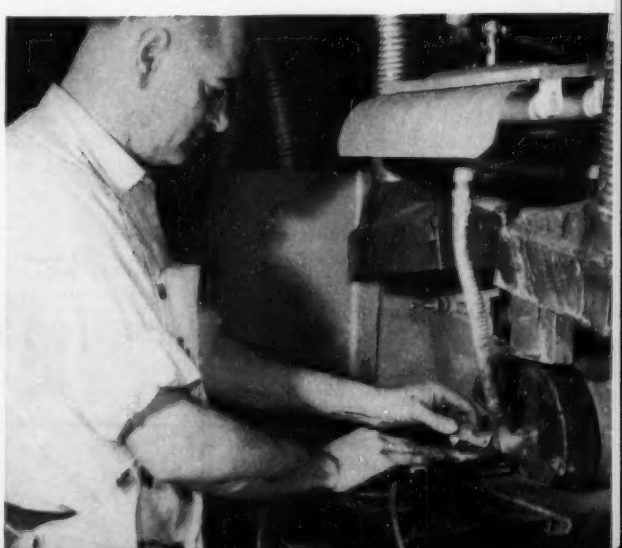
PLEASE TURN PAGE ...



NEW POWER SUPPLY available for conversion of tool grinders to electrolytically assisted metal-bonded diamond wheel grinding of carbides. Note foot switch for quick changes in current density



GRINDING SETUP, tool grinder equipped with tilting table, universal tool holder containing protractor, and a special templet. Greater hand pressure is required to maintain the same rate of production as conventional grinding with a vitrified-bonded diamond wheel



RATES OF CUT and diamond consumption were compiled by regrinding a large number of similar production carbide tools at a large automotive concern in Detroit. Auxiliary table is placed on regular table to raise level of tool to normal grinding position

table I . . **CARBIDE-GRINDING TOOL PERFORMANCE**

DIAMOND WHEEL	ELECTROLYTIC D120-N50M	CONVENTIONAL D120-R50V
No. tools ground	82	36
Linear wheel wear—thousandths in. per tool	0.040	0.170
Time for form grinding, min per tool	4-5	4-5
Av carbide removed—mils on length	23	19
No. tools tested	48	26
Arithmetical av pieces per regrind	130	112
Range, pieces per regrind	11-279	60-170
Tool finish—flat surface—mu in. rms	4-6	5-9
—profile surface—mu in. rms	10-14	14-16

Note: Under magnification of 75, cutting edges of tools electrolytically ground showed slight edge erosion.

Spindle oscillation: ½ in., 115 cpm
Voltage gap: 5
Amperage: 0 to 70
Carbide removal: average 0.015 to 0.025 in.

(Tool testing conditions called for rough turning, plunge cut ⅛ in. deep in nickel steel. Criterion for judging tool life was ability to hold shape and maintain satisfactory surface finish on machined stock. Table 1).

RESULTS

Compared with the R-grade vitrified-bonded wheel in conventional grinding, the electrolytically assisted N-grade metal-bonded wheel resulted in one-quarter the diamond consumption for approximately the same rate of cut. Judging from the range and number of tools tested, there appeared to be no significant difference in average performance of the tools ground by the two different methods.

In another series of tests, the Bura-Way grinder was altered so that the tools could be ground in a completely offhand manner with and without electrolytic assistance. This was accomplished by placing an auxiliary table on the regular table of the machine in order to raise the level of the tool to the normal grinding position. (Table II).

Considering the difference in concentration of diamond in the two wheels, the electrolytically assisted method required one-twelfth the amount of diamond used with the conventional method, while cutting at approximately the same rate.

Further tests were conducted with the cooperation of a large carbide tool manufacturer who had converted an off-hand carbide grinder for electrolytic assistance. 100 small tools of the same size and grade of carbide were finish ground. Current density varied considerably, averaging about 250 amps per sq in. (Table III).

Allowing for the difference in diamond concentration, the electrolytic method required only slightly more than one-third the amount of diamond, but cut approximately 8% slower.

TOXICITY FROM GAS GENERATION

As the electrolytically assisted method depends in part on electrochemical decomposition of carbide, it was logical to expect that toxic gases might be generated by decomposition of electrolyte. After a consultation between an industrial hygienist and the suppliers of the electrolyte, it was concluded that the toxic gases most likely to be present were ozone and nitrogen dioxide.

Gas analyses were made at the operator's breathing level while using electrolytic assistance of 250 amps per sq in., and with an exhaust placed above the machine a foot away from the grinding contact. Preliminary analysis indicated 11 to 16 ppm nitrogen dioxide, the permissible limit being 25 ppm for an 8-hr exposure per day. Ozone was 1.5 ppm compared with a permissible limit of 1.0 ppm. Since the finish grinding of carbide tools is an intermittent operation, it is unlikely that there is any health hazard because of gas generation when this particular electrolyte is employed.

A word of caution is advisable in connection with the unbiased conclusions drawn from the off-hand electrolytic grinding of carbide tools—the results should not be construed as applying to fixed-feed grinding operations, such as surface grinding using the periphery of a wheel.

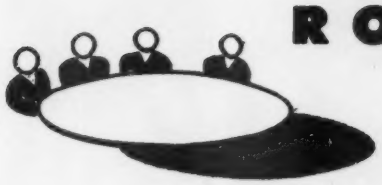
table II . . **GRINDING BY OFF-HAND MANNER**

Method	No. of Tools Ground	No. of Tool Types Ground	Total Time (Min)	Total Wheel Wear (0.001 in.)
Conventional D150-P100V	307	15	318	3.000
Electrolytic D120-N50M	307	15	309	0.500

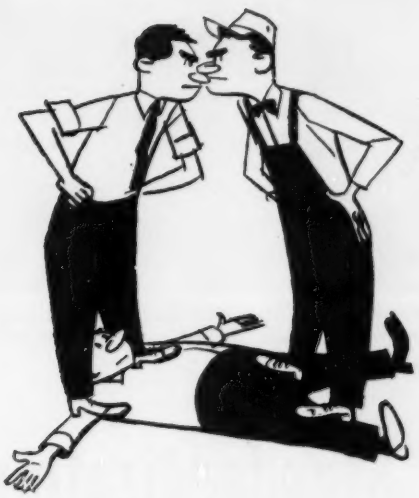
table III . . **FIELD EXPERIENCE DATA**

Method	Diamond Concentration In Wheel	Wheel Wear 0.001 in. per 100 Tools	Total Grinding Time Min per 100 tools
Conventional D180-P50V	50	4.500	130
Electrolytic D120-N100M	100	0.800	140

ROUND TABLE



Setup Stew



"What are you so mad about this morning, Al? I heard you blowing your top a half hour ago."

"It's that damned Master Mechanic's office, Ed. They're in my hair again. As if I didn't have enough trouble with the union!"

"Why? They're not union men, Al. What's the beef?"

"That's just the trouble, Ed. They're not union, and yet those guys insist on doing setup work in my shop. Here we've got three perfectly capable setup men who are union boys, and those jokers have to come in to make their 'special' setups."

"Well, you haven't had any trouble yet, have you?"

"No, but I'll bet I will. You can't blame a union man for getting irritated at seeing a non-union man doing his work, and I expect to hear from the shop steward any minute."

"You're looking for trouble that doesn't exist, Al. I think everyone in the plant knows there are times when the MM's office has to get in and dirty its hands on a job. They have to, just to know what's going to work and what won't. Even the union steward realizes that."

"Maybe so, but we've had union trouble for less cause, and less justifiable, too, Ed. I think they have a point if they want to push it. Besides, I don't like those guys coming in here and doing work I don't know about."

"Aha! There's the rub, Al. The real reason you're worked up is because you haven't any direct authority over the MM boys, and that you don't like."

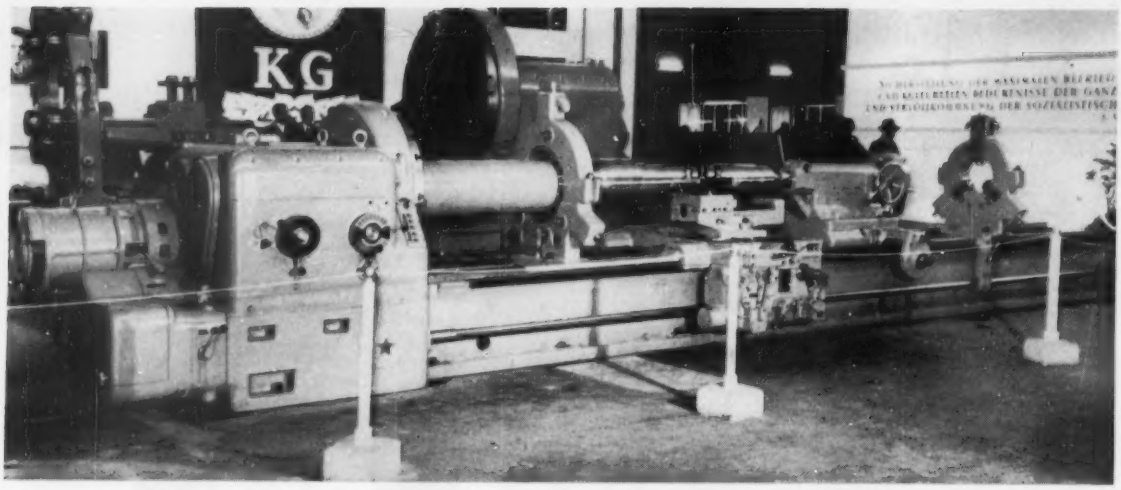
"That's not all of it, Ed. They come in here and disturb setups, then make my setup men run errands for them. I don't like the loss of prestige my men face."

"Why don't you ask them, Al? They're sensible men, and I'll bet they're glad of a chance to see some special work done. You know those MM boys are really good, and your setup men can pick up a lot of pointers from them."

"I don't believe it, Ed. I'll stack my setup men against any in the whole plant."

"That's fine loyalty, Al, but I think it covers a bit of jealousy. If you'll take my advice, you'll go and forget the whole thing. I don't believe you'll have trouble as long as you don't start it."

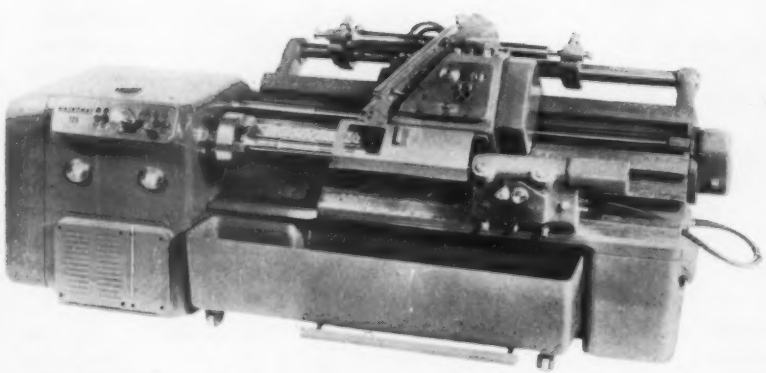
Is Ed minimizing the danger of union reaction to non-union work? Or is Al getting too excited about a special case that everyone understands? Your ideas on this subject may help others avoid trouble. Discussions of earlier topics appear on later pages.



HIGH CUTTING SPEEDS are claimed for this Czechoslovak lathe with 24 in. between centers and 20-in. swing. It has 36 spindle speeds ranging from 1.8 to 400 rpm, with power from a 44-hp motor. Max workpiece weight is 10 tons

Standardization Characterizes Communist-Built Machine Tools

Virtually every type of modern machine tool was exhibited at the recent Leipzig Fair. Here are some typical examples produced in Czechoslovakia, USSR, East Germany, Poland, Hungary, and China

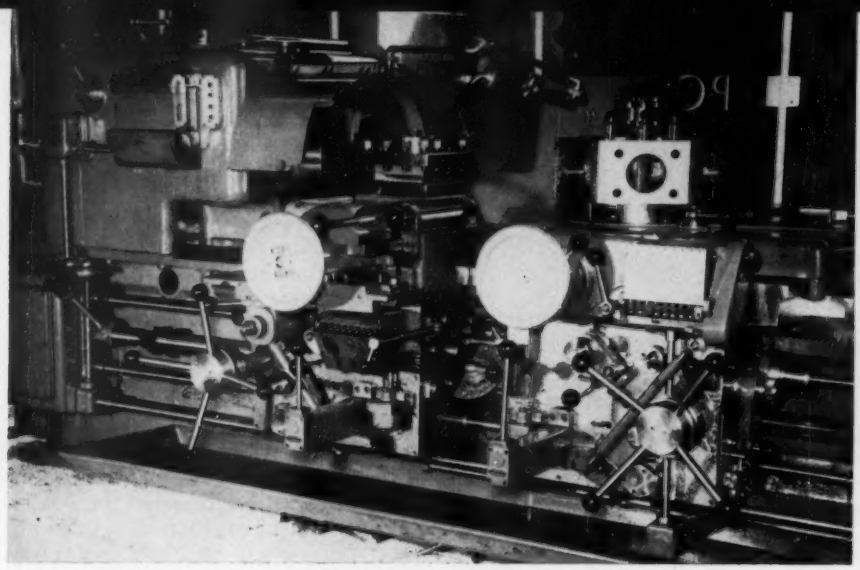


SPINDLE SPEEDS and feeds are programmed by punch card on this prototype of East German tracer lathe designed for high output with carbide tools. Automatic cycling for up to four consecutive roughing cuts, with fast return, is governed by longitudinal roll stop preset to diameters of master. For final turning, hydraulically operated cutting slide is tracer controlled. 12 speeds are from 224 to 2800 rpm; stepless feeds from 1 to 44 ipm. First production models will be out in 8 months

DAVID SCOTT, LONDON, ENGLAND

Occupancy of an entire hall at the Leipzig Fair by Czechoslovakia spotlights the emphasis that that country is placing on industrial exports. At previous postwar fairs it had shared a hall with one or more of the other Communist countries. Machine tools occupied the central portion of the 60,000 sq ft of exhibition area, and most of them were said to be standard designs now being mass produced.

The Machine Tool Research Institute in Prague, it is understood, has been engaged in incorporating the best features of existing ma-



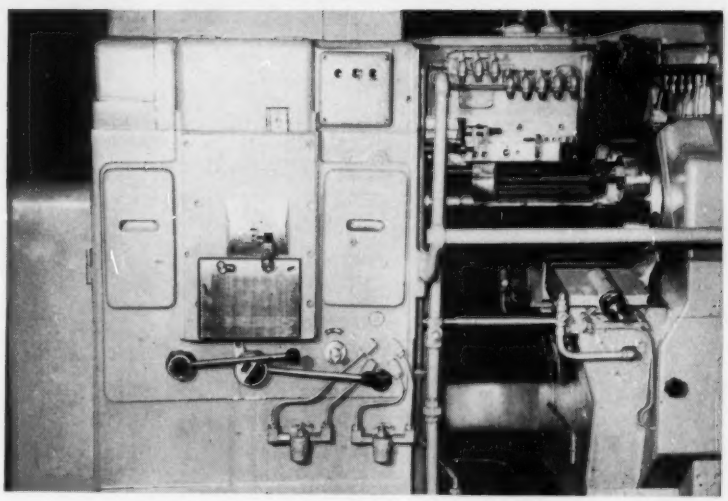
HYDRAULIC PUSHBUTTON preselection of spindle speeds and both saddle feeds is featured on this Polish turret lathe with 3-in. bar capacity and 17-in. swing. Speeds and feeds are changed during indexing of hex turret. Both saddles have 9 longitudinal and 9 cross feeds with automatic rapid traverse. There are 18 spindle speeds in 4 ranges from 10.6 to 1250 rpm, with appropriate indicating lamps on control box. Distance from chuck to turret face is 50 in. Smaller version for 2-in. bars and 15-in. swing does not have turret crossfeed

chines into basic models for each category. Attention has also been given to such points as simplification of controls (together with their grouping and duplication on both sides of the machine), automatic lubrication, and castings designed for easy cleaning and covering of working parts.

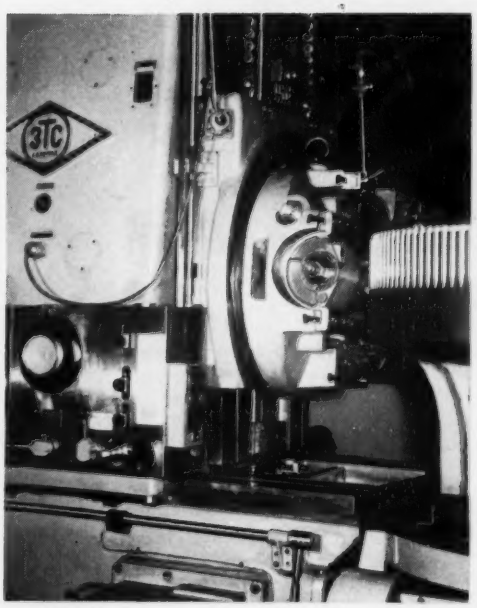
One single-spindle automatic, for example, is made in three sizes, with 5/8-, 1-, and 1 13/16-in. bar capacities. The two smaller ones are virtually identical, except for diameters and lengths, and range and number of spindle speeds. The third, while having larger castings, driving motor, hexagonal vertical turret, and other components, has many of the smaller parts in common with the others.

Czech milling machines at Leipzig provided another instance of standardized designs. A family of twelve machines has now been evolved—a horizontal, vertical and universal miller, each made in four sizes with tables 8x40, 10x48, 12x66, and 16x80 in. Many identical parts are found within each size group, while the construction and control mechanisms are the same throughout the series.

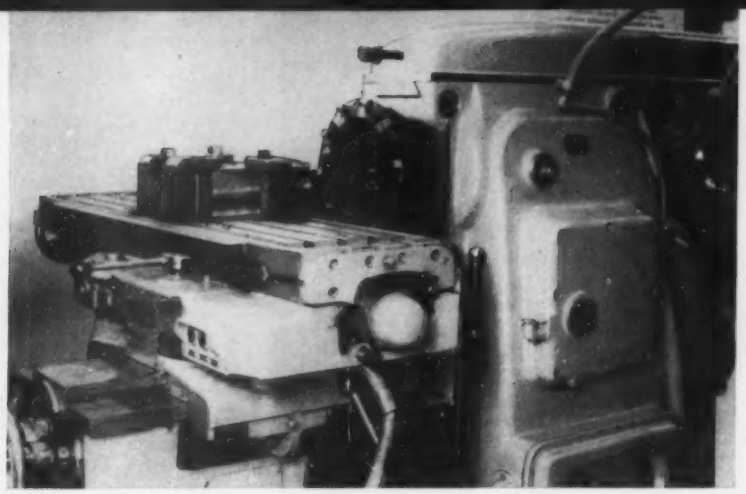
All feature a wide range of spindle speeds (the smaller ones go up to 4000 rpm) and power feeds, single-lever speed change with computer for rapid calcula-



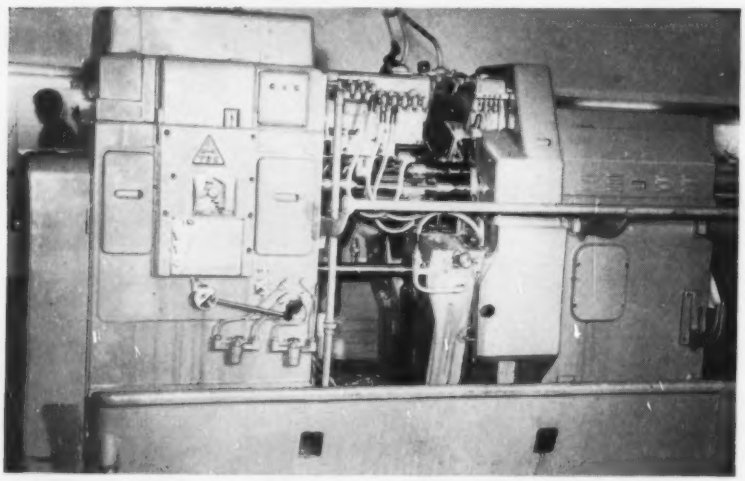
PROTOTYPE OF CZECHOSLOVAK 5-spindle, automatic chucker shown for the first time at Leipzig. Capacity is 5 in., with 4-in. turning length. There are four crossslides and 24 spindle speeds from 135 to 1793 rpm driven a 12-hp motor



RUSSIAN GEAR HOBBER with 60-in. work diameter takes helical gears up to 45°. There are 17 spindle speeds from 16 to 100 rpm, with vertical hob slide feeds ranging from 0.012 to 0.233 in. per rev of 53-in. table. Weight is 30 tons



UNIVERSAL MILLER, made in China, has 12 x 50-in. table swiveling 45°. 18 spindle speeds from 30 to 1500 rpm are from 8-hp motor. Longitudinal and cross feeds are ¾ to 37 ipm with rapid traverse. Vertical feeds are one-third of these



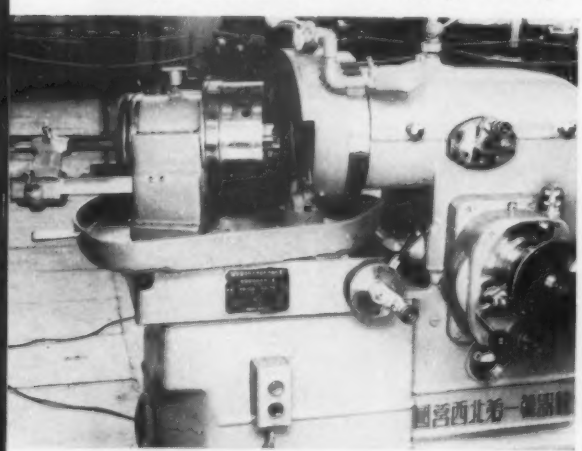
CZECHOSLOVAK 5-SPINDLE bar automatic with 1 5/16-in. capacity and 4-in. turning length. Feed strokes of 5 cross-slides are 0 to ¾ in. All are independently adjustable. Slide strokes are altered without changing cams; a system of levers simplifying setups for low production runs. Spindle speeds run from 143 to 1900 rpm in 24 steps

tion of required speeds for a given job, and electric feed releases. Optional equipment, again in four sizes, includes copying attachment for vertical millers, universal dividing heads, universal milling attachments for horizontal and universal machines, and vertical heads for the universal millers.

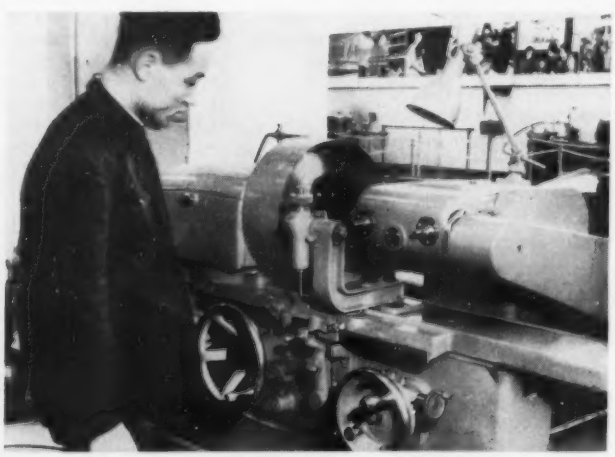
The bulk of Czech exports are known to stay within the eastern bloc, with increasing amounts going to Communist China. Preceding East Germany by several months, Czechoslovakia opened an exhibit of industrial products in Peking in September, 1952. But there are also reports of machine-tool exports to Lebanon, Syria, and other Middle East and South American countries with which new trade agreements have been concluded during the past year. At the same time Czechoslovakia is importing machines from the West, as exemplified by its $18.5 million agreement with France, last April, which lists machine tools among French deliveries.

While there were grounds for believing that Czechoslovakia was not showing its latest developments at Leipzig, the displays of Polish, Hungarian and Bulgarian machines (Rumania did not exhibit) probably indicated the current level of development in those countries.

A new Polish turret lathe, while presenting a confusing array of knobs and levers, incorporated hy-



CHINESE-MADE DRILL-POINT GRINDER. Twist drills, ⅜ to 3 in. in dia, are gripped in large chuck which runs at 24, 31, or 47 rpm. Swiveling work table permits grinding point of 70 to 140°

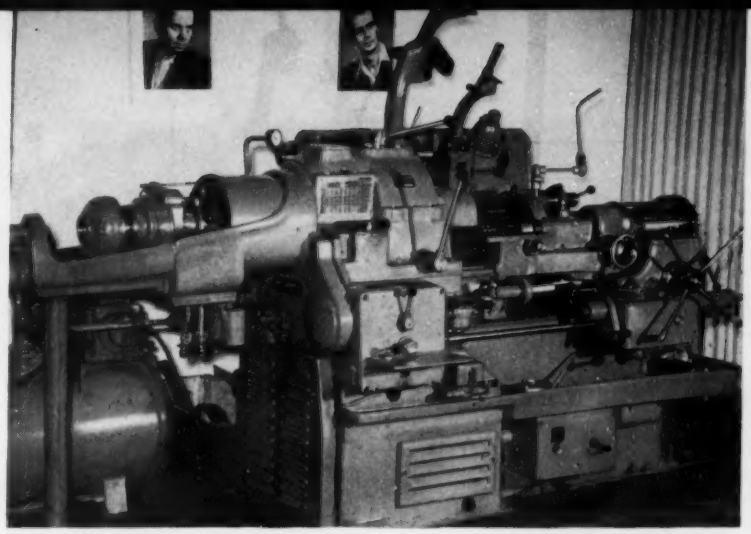


SPINDLE SPEEDS to 16,000 rpm on filmatic bearings are claimed for this Chinese internal grinder. Two bearing lubrication controls on front of head require periodic manual adjustment. Max grinding depth is 7¾ in. Grinding spindle, with 5½-in. wheel is 7 in. above table. Swiveling workhead runs at 3 speeds from 64 to 183 rpm

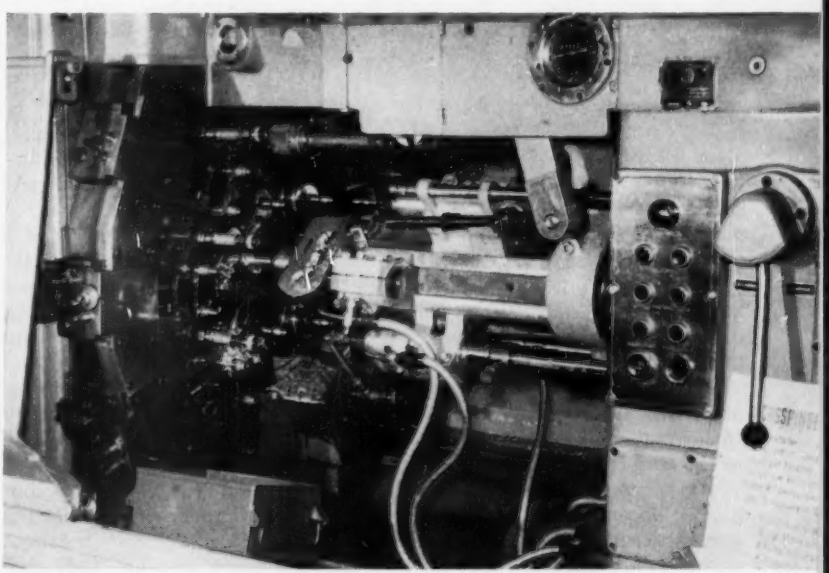
draulic pushbutton preselection of speeds and feeds. Other exhibits were less surprising, such as a car-wheel lathe with a 40-in. swing—the type of machine that Poland had previously specialized in (and exported) because of its own considerable production of rolling stock. Poland is very much a net importer of machine tools, as coal and foodstuffs provide the basis of its exports.

The Hungarian exhibit suggested a continued concentration on basic, multi-purpose lathes, radial drills, millers and the like, before embarking on more specialized models, although one automatic was a Pittler-type turret lathe. Finish and workmanship on all the machines shown was quite passable. Hungary is another country probing the China market, and reportedly also staged a display of machinery and industrial products in Peking, Shanghai and Canton this spring.

The exhibit from Bulgaria, which claims to have made its first machine tool in 1945, included some small center lathes and a simple slotter, shaper, universal miller, and column drill. It was stated that double-column planers with 31x84-in. tables were now being made, and that some of these machines were being exported. According to Bulgarian sources, an order for China was completed in May, and a trade agreement with India signed in July included the supply of lathes and eccentric presses.



HUNGARIAN, DRUM-TYPE turret lathe has 70 speeds with 2000 rpm max. Speed selection and spindle braking are controlled by same lever, 7 speed ranges are shifted by change gears. Swing over bed is 19 in., bar capacity is 1¾ in. Attachments are available for threading, tapping, grooving, and knurling. Air compressor at left is for bar-feed mechanism and pneumatic chuck



RUSSIAN SIX-SPINDLE BAR AUTOMATIC handles stock to 1½ in., with turning length of 8 in. There are 24 spindle speeds from 158 to 2170 rpm. All controls are grouped on panel at right. Larger model is under construction

EAST GERMAN INDUCTION HARDENER treats gear teeth individually. Gear is mounted on vertical shaft and moves into U-shaped coil which heats tooth flanks. After water quench, gear is lifted clear of coil, indexes one tooth, and cycle repeats. Sequence is automatic, and mechanism can be preset to stop after one full revolution to avoid double hardening. Machine can handle gears to 16½-in.-dia, 1½ in. thick, helical up to 30°. Time required per tooth is 8 to 10 sec, and normal hardening depth is 0.059 in. A VT oscillator operating at 400 kc supplies power

minimize operations...

increase accuracy...

improve wall finish...

feed above 6 ipm, with...

Screw-Machine Converted for

Result was so satisfactory two years ago when Hartford Machine Screw Co, Hartford, Conn, converted a Heald Borematic for high-speed gun-drilling that the company recently decided to build a second machine for a special 17S-T6 aluminum job. Here is how the machine was built and how it pays its way

Effective tooling is the key to successful competitive manufacturing. And unhampered ingenuity is the keeper of this key. While it is important to have the proper machinery to accomplish a job, it is equally important to think beyond the machine to the tooling—therein lie the multiple advantages that bring success and profit.

Typical of this thinking is that at the Hartford Machine Screw Co. In addition to its extensive contract work, this company manufactures a variety of products—for instruments, locomotives, aircraft engines, diesel engines, and textile mills. These diverse and highly competitive fields demand originality in tool thinking.

One of the products in the textile category is a line of spindles. Each textile plant uses thousands of these devices and they operate at very high speeds. Thus, while they must be made to very close tolerances, the manufacturing cost must be within a competitive range.

Boring the mounting bearing in two styles of these spindles created a bottleneck. One spindle bearing calls for an ID of 0.282 in. and the other is 0.387 in. Tolerances are ±0.00025 on the dia and 0.0015-in. total variation in concentricity. While the holes are only 2 in. long, this detail required five operations: drill in turret lathe, rough bore, assemble, semi-finish bore, and finish bore. Material is 17S-T6 aluminum alloy and the total time for the four cutting operations was 2 min. 10 sec per pc. Scrap was high.

Having had considerable success with a previous gun-drilling machine, built from an old Heald Borematic, tool engineers decided to build a special gun-drilling machine for this job. This time they found a Brown & Sharpe No. O screw-machine ready for salvage. After stripping off the turret, but leaving the carriage, and replacing the headstock spindle bearings, they mounted a 5-hp, 3600-rpm motor on a platform above and just behind the headstock. A direct (V-belt) drive with a 1¾:1 ratio was used to connect the motor to a sheave on the machine spindle, to turn the latter at 6300 rpm.

A rotating coolant adapter was added to the outboard end of the machine spindle and a hydraulic pump powered by another 5-hp motor, and capable of pumping 16 gpm of coolant at 550-psi was installed at the rear. A large settling tank and reservoir were also provided.

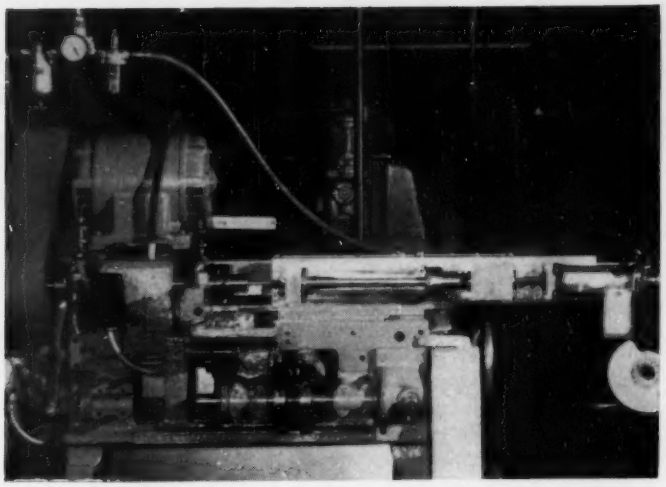
At the inboard end of the machine spindle, a collet adapter was attached to hold the gun-drill. It was designed so that coolant could be fed to the drill under pressure without leaking at the adapter. New cams were made to provide, by means of the machine carriage, a *positive* drill feed of 0.0012 in. per rev of the drill. *Feed per revolution is the most important single consideration in gun drilling.*

Next, a fixture was built to hold the workpiece (spindle) for drilling. One end of this fixture contained the starting bushing for the drill and a seat for the end of the workpiece. The opposite end of the fixture was fitted with a self-centering clamp, actuated by an air cylinder. The fixture was aligned with the drill axis to less than 0.0001 in. deviation, then dowelled and bolted to the screw-machine carriage. An acrylic-plastic hood was made to cover the work area during drilling. This guard prevented splash from the high-pressure coolant but permitted a view of work progress and chips. Chip form is an important indication of cutting action and a warning when trouble threatens.

Gun drills were purchased from Eldorado Tool & Mfg Corp, with drill angles especially ground for aluminum. The reservoir was filled with a high-EP gun-drilling oil, formulated to provide lubrication under high pressure and high temperature as well as cooling action.

Gun-Drilling

WM M STOCKER, JR.
ASSOCIATE EDITOR

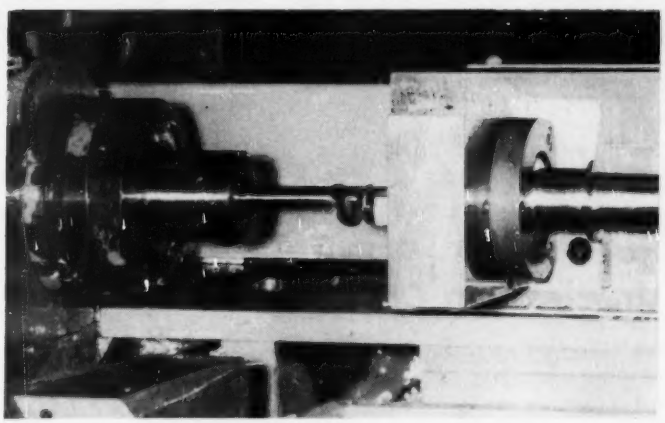


POSITIVE ACTION OF CAM FEED is a valuable asset in gun-drilling so screw-machine was selected for this setup. Work-holding fixture is mounted on machine carriage and 4 hp motor drives spindle directly, with 1:1¾ step-up in rpm. Special cams provide 0.0012 ipr feed. Acrylic-plastic guard was removed for photograph

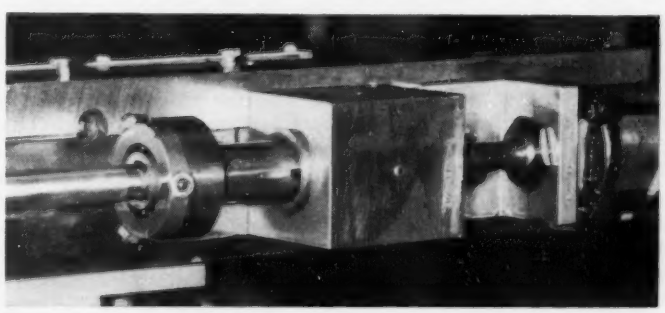
As is customary, the ID of the starting bushing was held to 0.0002 in. over the drill size, or exactly the desired hole size. This bushing acts as a guide for the self-piloting gun-drill until the hole is deep enough to take over, hence its diameter is extremely critical.

After drilling a few test pieces to check alignment, the production run was started. On the first batch of pieces, floor-to-floor time averaged 1 min. per pc, all of the dimensions were well within specifications, and scrap was negligible. Wall finish after drilling was better than 6 mu-in. rms. At 6300 rpm and 0.0012-ipr feed, the drill was advanced at 7½ ipm.

Using the five-operation method previously described, production was 25 pc per hr and rejections resulting from the tight tolerances were a problem. Thus, the new setup repaid its cost within a very short time. In addition to more than doubling output and improving quality, the modified machine completed the piece in one setup using a single operator. Tool life for the carbide-tipped gun drill was 10,000 pc, or 1700 ft of depth, per grind. And the drills were removed at the first sign of wear to prevent extensive damage as well as to simplify resharpening. A third machine is under construction.

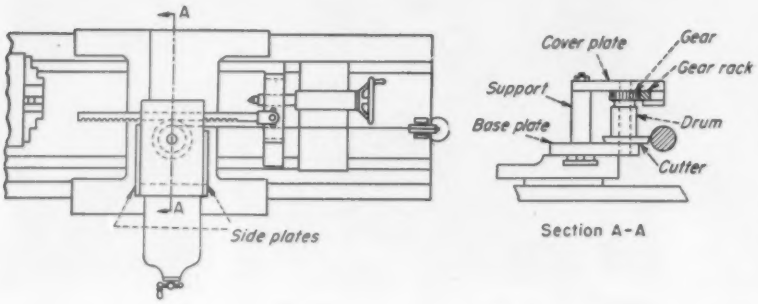


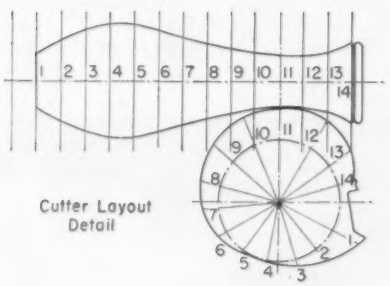
DRILL IS TURNED in this setup and workpiece is held stationary in air-operated clamping fixture. The latter also contains starting bushing and is fastened to the machine carriage. Work is fed to the drill. Chips and coolant drop between ways to settling tank



SELF-CENTERING CLAMP, actuated by a commercially available air cylinder, holds spindle to be drilled firmly in seat and aligned with drill. This arrangement speeds work loading and permits a variety of work lengths without changing tooling. At least 60 pc per hr are completed

Practical Ideas





Wound-Up Form Tool Unwinds to Cut Contours

We recently had an opportunity to do quite a bit of contour turning on brass castings. To do this work we designed and built the apparatus shown. We produced the form on the work with a form tool, but, instead of making the tool straight, the form was "wound" on a circle, so the tool operated on somewhat the same principle as a gear hob.

The fixture consists of a base plate, an upright, and a cover plate, and is stiffened by two side plates. Supported in the upper and lower plates is a shaft, keyed to which are a cutter, a drum, and a gear, which meshes with a gear rack. A bridge, clamped to the bed just forward of the tailstock, extends over the top of the tailstock sleeve. The right end of the gear rack hangs on an adjustable pivot which is clamped to the bridge. On the finish cut the pivot is positioned so the gear rack is parallel to the bed. For roughing cuts it is at a slight angle.

Attached to the drum is a steel cable which makes a few turns around the drum and runs to the end of the bed and over a pulley. A weight, to take backlash out of the rack and pinion, hangs on the end of the cable. The cable is wound to rotate the cutter away from the direction of the cut.

The cut is started at the right hand end of the work. The cutter is positioned on the first piece by slipping out the rack and rotating the gear to produce the necessary correction. Fine adjustment is made by shifting the bridge at the tailstock. The cutter is fed into the rotating work and the longitudinal feed is engaged to feed the carriage to the left. As the carriage feeds, the cutter rotates and produces the correct contour; because the cutter cannot get out of synchronization with the work, the feed can be stopped, started, or changed.

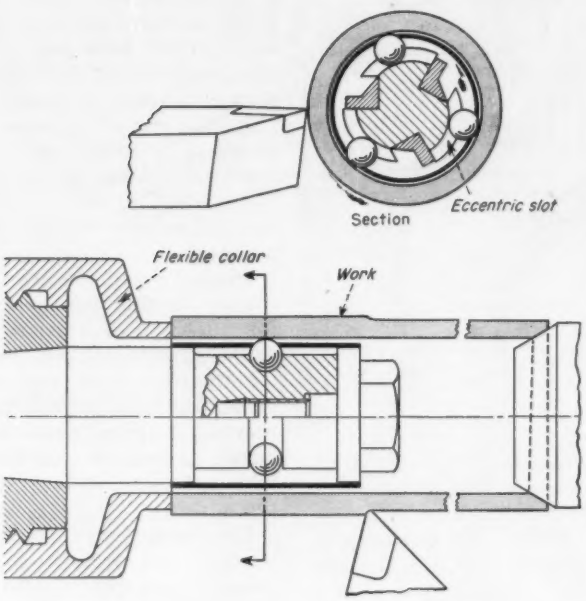
To lay out a cutter, divide the work into an equal number of parts. Where the contour of the part changes rapidly, half divisions can be placed between major divisions. Now scribe a circle on the tool blank equal to the pitch diameter of the gear. On this circle scribe equally spaced radial lines, spaced so the length of each arc is equal to the length of the sections into which the work was divided. The angle between each radial line can be calculated with this formula:

$$\frac{L}{d} \times 360 = \text{Required angle}$$

where L = length of each division of the work, and d = pitch diameter of the gear. The radial lines are numbered to correspond to the divisions on the work. Starting with the largest work diameter (in this case, point 4) the point where line 4 crosses the circle is a point on the tool. On line 3 measure the difference between the work radius at point 3 and 4, and add this difference to the radius of the scribed circle, giving a second point on the tool. Repeat for each line.

To make the tool after the line is scribed, the water-hardening tool steel is contour-sawed to the scribed line and band-filed at the proper clearance angle. The tool is then hardened, ground top and bottom, and the cutting edge is either stoned, or ground on a vertical profile grinder. The tool is sharpened by taking a light grind over the top face. This causes a very slight change in the length of the finished contour. *Clifford Molloy, Bronx, N Y*

To provide a hexagonal recess when you want to turn a part with a hex wrench, drill and tap the part for a hex-head setscrew and secure the screw with a "dutchman." The screwhead furnishes the desired grip. *H Murro, Bayonne, N J*

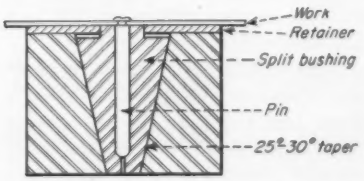


Ball-Bearing Tube-Driver For Rough ID, Finished OD

In our shop we had to turn the OD of a number of tubes, the ID of which was left rough, and varied as much as 0.040 in. in diameter.

Our solution was this ball-bearing tube-driver, which has these advantages: quick clamping, relatively large chucking capacity (in our case, to 0.100 in.) allowance for heat expansion of the work, alignment of the work at three points concentric with the axis of the work, quick release by withdrawal of the tailstock, and very little springing-out-of-round when the work is unchucked.

Here is how the driver works. As the tube is pushed over the tube-driver, and the tailstock center is pushed into position, the tube is turned by hand in the direction opposite to normal rotation. When the tube is turned, the three balls, which ride in eccentric channels of a radial taper of perhaps 5-6°, move into the work and clamp the tube. Cutting is then begun, and the tube is driven by the three balls. The drive is quite solidly maintained, because clamping pressure is in direct ratio to cutting pressure. The flexible collar absorbs any slight expansion resulting from heating of the workpiece. *Anton Fischer, Zurich, Switzerland*



Split-Bushing Fixture Simplifies Staking

We were having trouble with a staking operation, because the pin was about 2 in. long, and only 3/16 in. in diameter, and when the pin was struck, it tended to mushroom on the end opposite to the staking. When this happened, the pin was hard to remove from the fixture. To correct this situation, we made a split-bushing fixture. The bushing had a taper of about 25°, and was set in a plate of like taper.

After staking, when the operator lifted the finished workpiece, the upward motion tended to raise the split bushing, thereby releasing the pin, which could ride up to the retaining plate. *E G Filipowicz, Milwaukee, Wis*

Elliptical "Spaghetti" Simplifies Wiring

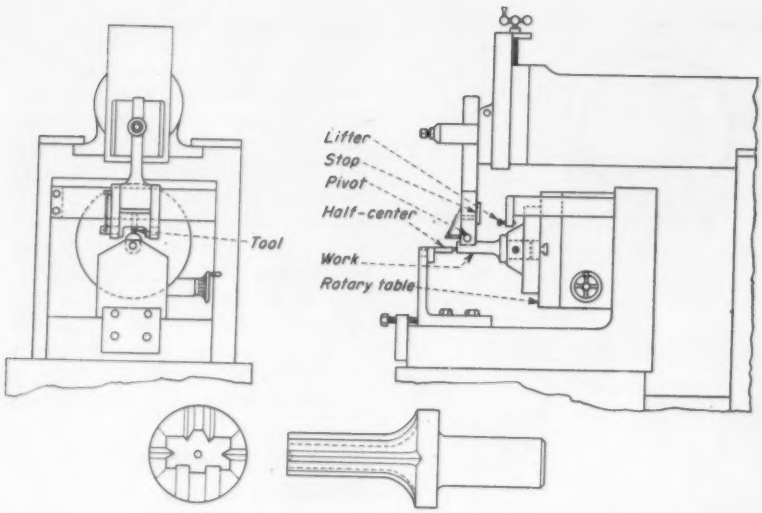
Where numbered and lettered plastic "spaghetti" is used in electrical circuits to identify leads, the usual method of application involves a special tool which stretches the sleeve while the wire is being inserted. Then, when the tool is removed, the plastic returns to its original size, gripping the wire.

We decided to try an elliptical sleeve to replace the round one

and do away with the special installation tool.

Pressure on the major axis of the plastic opens the tubing and, after the wire is inserted, the plastic is released and returns to elliptical shape, gripping the wire. *G Collinson, Herefordshire, England*

Needle bearings or used sewing needles make excellent scribers, being very hard, and having no soft core, which many phonograph needles have. The needles can be reground continuously, and are tough enough to be used as center punches. The points are pressed directly into the end of a piece of round CRS and ground to the desired point. The handle of the CRS can be knurled, if desired. *Roger Isetts, Kenosha, Wis*



Attachment to Shaper Cuts Hand Work On Punches

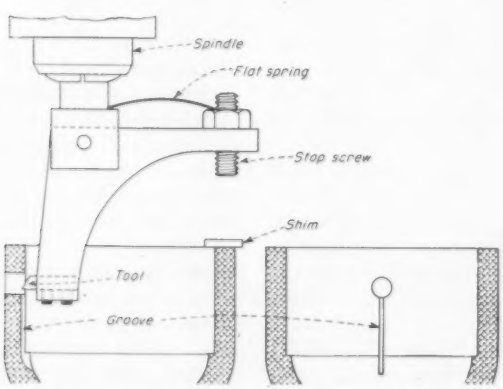
Many of our dies require punches which cannot be easily machined in the usual way. To reduce the amount of hand work required in making these punches, we built an attachment for the shaper to permit shaping them right to size. The attachment is essentially a holder and pivoted tool which swings clear of the work at the end of the shaper stroke.

The work is held at one end by a punch-holder and adapter, which, in turn, are mounted on a small rotary table fastened to a large angle plate. The large angle plate is bolted to the machine bed. The other end of the work is supported by a center, half of which has been cut away to improve visibility. We have made several adapters and holders for different size punches.

The tool is held in a pivoted toolholder. As the tool moves along the work and approaches the end of the stroke, a stop plate strikes the trunnion lifter, and the tool pivots upward on the trunnion bearing. A spring holds the toolholder against the stop while cutting, and this stop takes the cutting pressure.

The tool cuts on the back stroke. Vertical and cross feed of the shaper table, rotary feed of the rotary table, and toolfeed, which can be set at any angle, combine to give flexibility and versatility to this fixture.

Our usual practice is to lay out the desired shape on the end of the punch and shape to the layout line measuring as we go. *Henry Gifford, Bronx, NY*

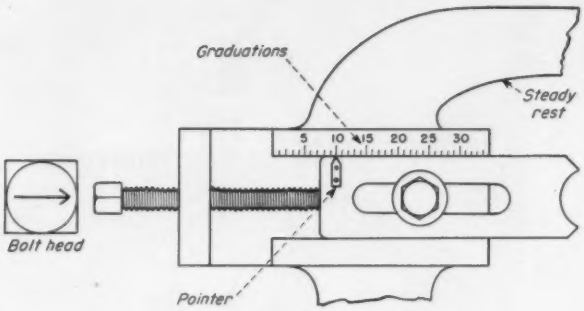


Pivoted Cutter Forms Oil Grooves

We had a recurring order to cut oil grooves in a rather large number of aluminum housings. At first we tried a grooving chisel, but found it was too slow, and results depended too much on the skill of the operator.

Therefore, we made the arrangement shown *(left)*. The quill and spindle are part of a conventional vertical miller, although a slotter or other machine with reciprocating motion, would probably have been better. As the quill is brought down, the stop-screw hits a shim (held in place by a clamp which is holding the housing in place), and the toolholder and tool pivot.

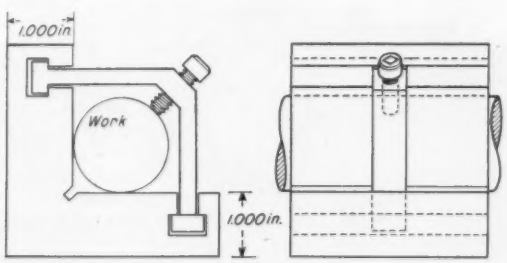
The tool is first set up to clear the shoulder at the base of the bore, and the table is fed toward the cutter. While moving the quill up and down like a slotter, move the table toward the cutter until the bore is reached. Then raise the quill to the oil hole and continue the operation, cutting until the required depth is reached. It takes about five passes to complete the groove. *J E Bittern, Weatogue, Conn*



Graduations Speed Steadyrest Setup

To save time setting up steady rests we filed a flat next to each jaw and graduated this edge. The graduations are spaced equal to the pitch of the jaw feedscrew, not especially accurately, as long as there is no cumulative error. We scribed the graduations and cut them with a small hand grinder. We then chucked a piece of round stock and took a light cut on it, to get it to run true, and moved the steadyrest jaws in against this round piece and locked them in place. We then attached a pointer to each jaw, to point to the same graduation. The pointer was used instead of a scribed line on the jaws, because it can be moved when the jaws are ground. We ground an arrow in the head of each screw, all the arrows pointing to the right.

Now when we use the steadyrest, the jaws are all set to the same graduation, and the screws are adjusted until they fit the work and the arrows point in the same direction. Then we are sure the work is properly set up. *Henry George, Bronx, NY*



Right-Angle V-Block For Circular Layout

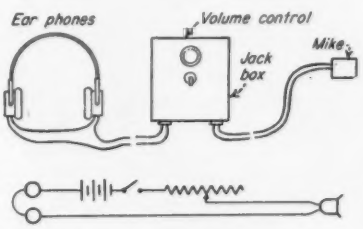
This right-angle V-block makes layout of circular members much easier by having 1.000-in. sides at right angles. (Accuracy of the 1-in. dimension depends on requirements.) To pick up the center of, for example, a 1½-in. round bar, there is no need to lay out the center by usual methods, because it is known to be 1¾ in. from the reference table when held in this V-block. If it is necessary to turn the work 90°, the center remains at 1¾ in. from the table, and doesn't have to be picked up again. *Walter Trimailo, Bronx, NY*

Improvised "Sound Locator" Checks Special Machinery

In our shop we build special machinery, and, in this type of work, we needed some way to identify spurious noises which develop during tryout of the machines.

Our remedy was a "sound locator" which was made out of surplus electrical equipment, available at the local war surplus store. The earphones are no. ANB-H-1, and the microphone is no. MC-254-A. The junction box phone jacks, and 3 ft of rubber-coated wire are standard items.

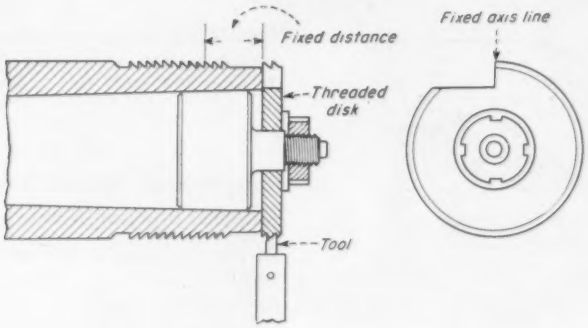
First, we removed the station finder and knob from the junction box, and, in their place, put a small toggle switch. This gave us a box



with volume control, a switch, and jacks for mike and earphones. We then mounted two flashlight batteries in the intercom box, packing them with heavy insulating paper. With the cover fastened tightly, the intercom box was a complete, compact unit, into which the phones and mike are plugged.

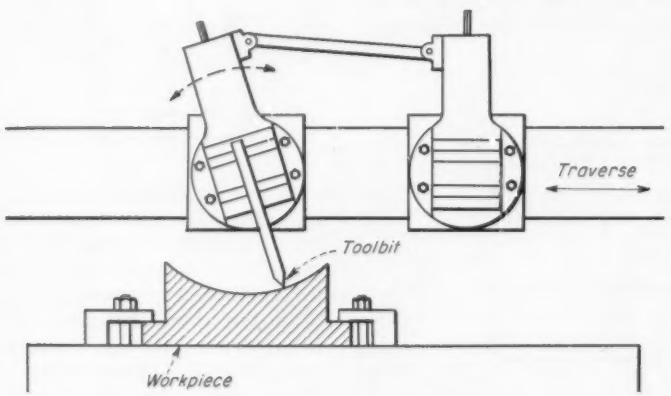
The mechanic checking a machine puts on earphones, snaps the switch on, and applies the mike to various parts of the machine.

This setup will also be handy in making adjustments on large, noisy machinery, by putting an extension cord on the mike. Then the mechanic wears the earphones, and the crane operator makes adjustments. *Irving Epstein, Seattle, Wash*



Threaded Plug Starts Cut At Correct Radial Position

We have occasion to thread the OD of our product to a definite start of thread at a given length on a given axis line. This is done so that any mating component will assemble to its correct radial position. The setup shown here makes an otherwise very difficult task into a relatively simple one. The threaded plug is driven into the tapered bore of the workpiece, and the threaded disk is fastened carefully in place, so that the cutout on the disk is exactly at the required axis line. The threading tool can be set at any point on the thread of the end-disk, and the resulting thread will still have the desired characteristics. *J. Stewart, Glasgow, Scotland*



Traverse One Planer Tool To Cut Radius With Other Tool

When planing a radius of, for example, 12 in., this attachment will simplify the job. The desired radius is set from the center of the pivot of the bar to the tip of one tool, and the pivoted slide is locked in position on the cross-slide. The locknuts are slackened to allow the box to rotate. A solid bar is then fastened between the two boxes and, when the non-rotating box is traversed, the pivoted tool will cut the radius. *R. K. Edwards, Lancashire, England*

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REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y.

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thru *faster* continuous broaching of multiple parts

• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

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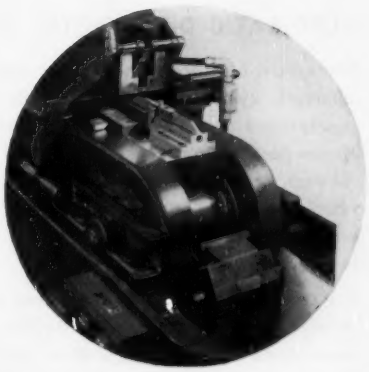
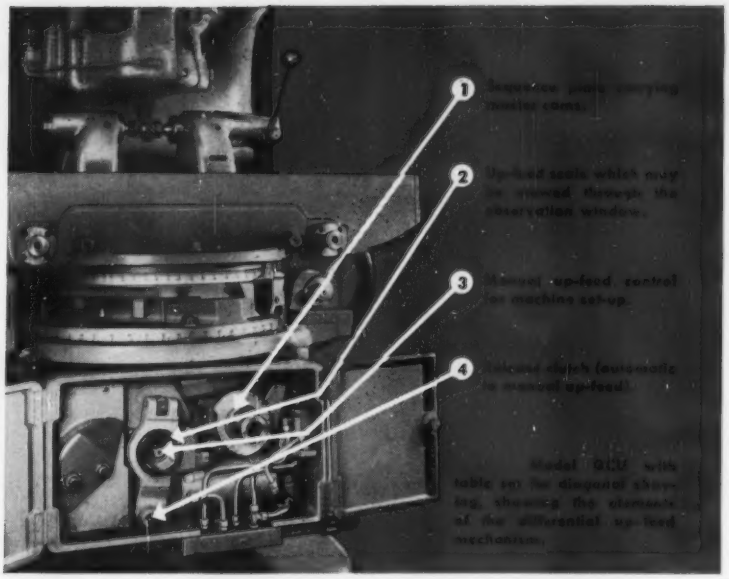


• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT

MACHINE TOOLS

GEAR SHAVING NOW *Much Faster and More Flexible*

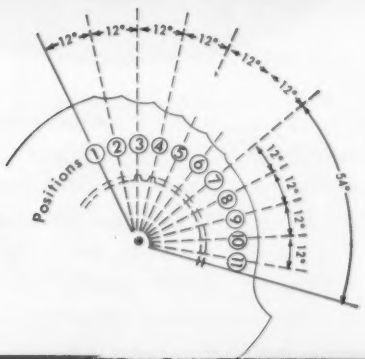


When Automatic Differential Up-feed and Conventional Crowning were added to the Red Ring Model GCU, shaving speed, flexibility and economy were all significantly increased.

AUTOMATIC DIFFERENTIAL UP-FEED

This efficient device provides for the first time an automatic cycle applicable to both diagonal and conventional shaving. This cycle is controlled by an eleven-position master cam. Included are backlash take-up, infeed cutting strokes, idling strokes and return to unloading backlash. The entire cycle or any portion of it may be used depending on job requirements.

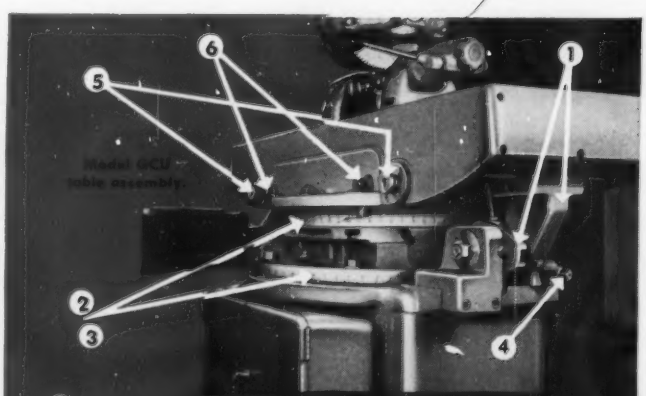
The cam itself does not actuate knee movement. It is strictly a stepped gaging device. Consequently every knee movement is positive, extremely precise and very fast. No danger of operator's errors. Perfect accessibility for fast loading and unloading.



One of the two control cams carried by the feed unit sequence plate.

CROWNING

Gears being shaved conventionally can be crowned by rocking the table about a central pivot during the automatic cycle. The cam controlling the rocking movement is located on table centerline to avoid any tendency to twist. This device also provides for taper shaving.



1. Crowning cam and bracket.
2. Index for diagonal shaving take-up.
3. [illegible]
4. One of 2 tapered shot bolts used to realign table and ways for conventional shaving.
5. Lock pins which removed, permit table to rock for conventional crowning.
6. Bolts operated from the front of the machine actuate tapered wedges to lock table to the ways.

Write for Bulletin 553-7 for full details.

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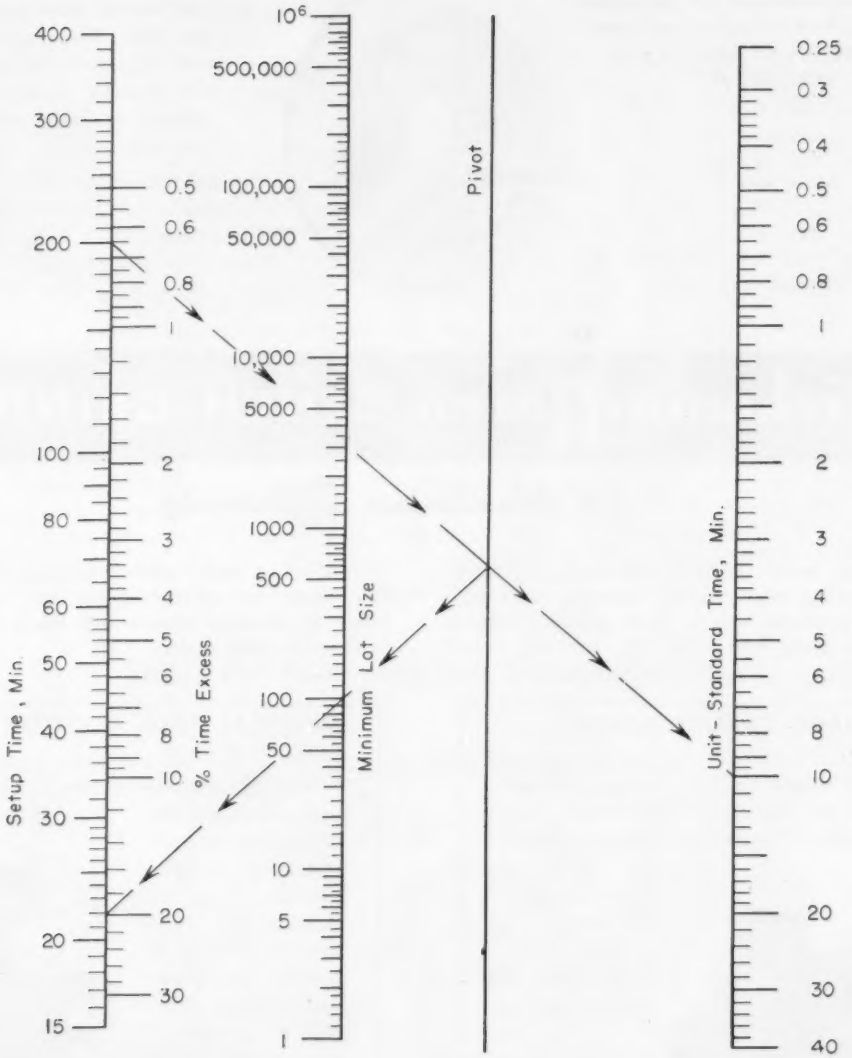
6585

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

American Machinist REFERENCE BOOK SHEET

Minimum Economical Lot Sizes

TYLER HICKS



Minimum lot sizes for shop orders are often based upon an arbitrary relationship between setup time and unit-standard time. Procedure is to choose an arbitrary maximum percentage by which the true unit time may exceed the standard time; this may run from 1 to 15% or more. The accompanying chart permits a quick estimate of minimum economical lot size and is based on the formula $N=S/TK$, where $N=$ number of pieces in minimum lot size, $S=$setup time, min., $T=$ unit-standard time, min., and $K=$ maximum percentage that is arbitrarily selected.

EXAMPLE: What is the value of N for a setup time of 200 min., a unit-standard time of 10 min., and K is 20%?

SOLUTION: Draw a line from 200 min. on left-hand scale to unit-standard time of 10 min. on right-hand scale. From intersection of this line with the pivot line, draw a line through 20% on the "% time excess scale." The minimum economical lot size is then found to be 100 pcs on the appropriate scale.

Wickman DIAMOND WHEELS

(RESINOID-BONDED & STEEL-BONDED)

for Free Cutting... Quality Grinding... Longer Life

WICKMAN resinoid-bonded diamond wheels are recommended for use where extremely fast, free cutting action is most important. They can be supplied in a full range of types and sizes.

WICKMAN-NEVEN steel-bonded diamond wheels are practically indestructible. Diamond particles stay in place until worn, thus eliminating expensive loss of unexpended diamonds. These steel-bonded wheels are noted for their long-life and the extra number of tools they grind.

WICKMAN steel-bonded chip breaker diamond wheels have an unusually long service life. They will cut standard depth chip breaker grooves in carbide tools *in a single pass.* 1½-2 minutes is required for average size tool.

All standard shapes, types, and sizes of Wickman diamond wheels are available. Regardless of your cutting or grinding operation, it will pay you to investigate their quality features.

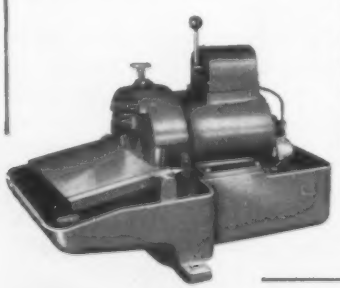
Wickman-Neven BENCH GRINDERS

for Maximum Efficiency

Wickman-Neven bench machines are designed especially for grinding and lapping carbide tools with steel-bonded diamond wheels. Both grinders feature built-in coolant pump and 1-HP full reversing motor in addition to many other advanced design features. You can be sure of highest efficiency and economical usage of diamond wheels with these bench machines that cut grinding costs.

OFF-HAND CARBIDE GRINDER

Model GF-2 bench machine provides maximum convenience, accuracy and speed when sharpening either left- or right-hand tools. Angular table adjustments from 5° above to 15° below horizontal can be quickly made. Compactly built (16½" wide x 26½" deep x 16½" high) this sturdy grinder will give many years of heavy duty service.



UNIVERSAL TOOL & CUTTER GRINDER

Model GF-3 has a swiveling motor head and a swivel table with vertical, longitudinal, and transverse movement. This fully universal tool and cutter grinder can be utilized for cutting off, chip breaker grinding, or general tool grinding. Standing 31¾" high, this grinder requires a 30" x 30" table area.

THE Wickman MANUFACTURING CO.

10325 CAPITAL AVENUE

OAK PARK (Detroit 37), MICH.

American Machinist REFERENCE BOOK SHEET

Watch Jig Operating Costs ... I

W J KOKOSKIN, Supervisor, Industrial Engineering Dept, CANADIAN MARCONI CO

Modern tool engineers are well acquainted with methods for designing jigs and fixtures that produce parts to close limits. However, they tend to overlook the relative cost of operating such devices of various types. This is a serious omission, because the process time is usually small, and hence the cost per operation is governed largely by the relative ease of clamping and unclamping the jig.

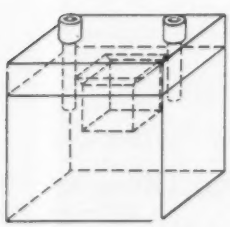
Extreme variation can occur in the cost of operating a poorly designed jig as compared to that of a fairly good one. At a labor rate of $2.40 per hr, the cost of operating the jig shown at No. 1 this page may be assumed to be $27.88 per 1000 pieces. This figure is based on a cost of $23.80 for clamping and unclamping and $4.08 more for inserting and removing a part in the tapered nest, which is comparable to the condition at illustration No. 2, page 175. If you combine the features of clamping arrangement in No. 6 and the tapered nest and knockout of No. 5 in loading methods, page 175, the cost per 1000 pcs is only $3.76, or only 13% as much. As the faster-operating jig will cost only about $25 more, the extra outlay will soon be recovered on production work.

Tool designers should often be given a course in work simplification. If jigs produce parts outside tolerance limits, the situation is readily discovered and corrected. But aspects of work simplification and cost reduction escape notice, unless there is an adequate instruction program. The operator may complain about clumsiness, difficulty of loading and unloading, plugged chip holes, and lost jig parts. Perhaps the timestudy man notices these matters. However, the jig may be used for a considerable time before the faults are corrected. Sometimes such jigs are used for years.

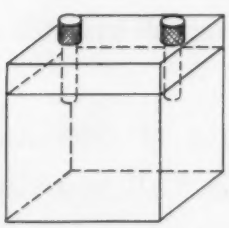
How much do such losses cost in-

Times for Clamping and Unclamping Jigs

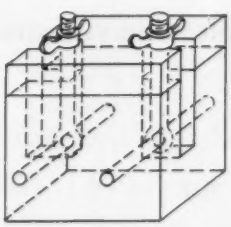
No. 1 – 0.595 Min.



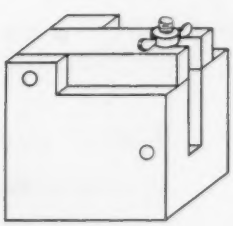
No. 2 – 0.348 Min.



No. 3 – 0.182 Min.



No. 4 – 0.127 Min.



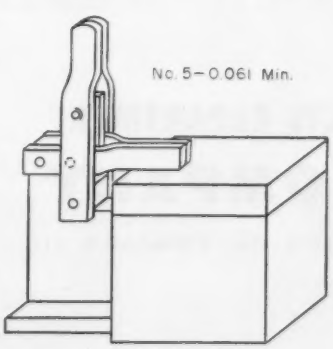
NOTES:

Nos. 1 and 2—Both methods are slow, because the operator must use an Allen wrench or fingers to back out and replace the screws

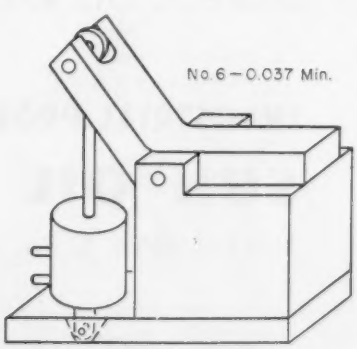
Nos. 3 and 4—Better time is made when the lid is clamped by wingnuts on hinged studs, or with a single wingnut or screw

Nos. 5 and 6—Best times are shown when the lid is operated by a quick-acting clamp, or with the hinged lid actuated by an air cylinder, leaving the worker's hands free for loading and unloading

No. 5 – 0.061 Min.



No. 6 – 0.037 Min.



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Watch Jig Operating Costs ... II

dustry, and especially your plant? In the long run, hidden costs of this sort may be far higher than the value of the parts, if poor jigs are common. If the waste figures were uncovered and shown to management, they would immediately take steps to correct the situation.

The applications of good design principles, both clamping and work locating, are illustrated mainly in respect to drill jigs, which are most common. However, the same principles apply to jigs and fixtures for milling, welding, assembly, etc. In view of the potential savings, you should make up your own "standards sheets" showing mechanical clamping devices available and their typical applications.

Rules for Jig and Fixture Design

1. Taper all holes and nests so parts can be easily inserted and removed from jigs.

2. Use fast-acting clamps, eccentric clamps, cams and air cylinders, wherever possible. Avoid using screws and nuts, because they are slow and inefficient.

3. Make the nests and clamp-down devices fit as loosely as tolerances of the final product will permit.

4. Locate handles and pedals so they blend with preceding and following operations. To accomplish this, make out a rough layout of the job and analyze all the motions that the operator will follow.

5. Allow plenty of room for chip clearance.

6. In welding jigs, or other types of jigs where material changes size or shape, (that is expands or warps), allow sufficient clearance for ease of insertion and removal from jigs.

7. If the process time is lengthy, check the possibility of making multiple jigs, so loading and unloading may be accomplished during process time.

8. If air cylinders are used, see if valves can be located on the machine and operated mechanically, thus saving time and motions.

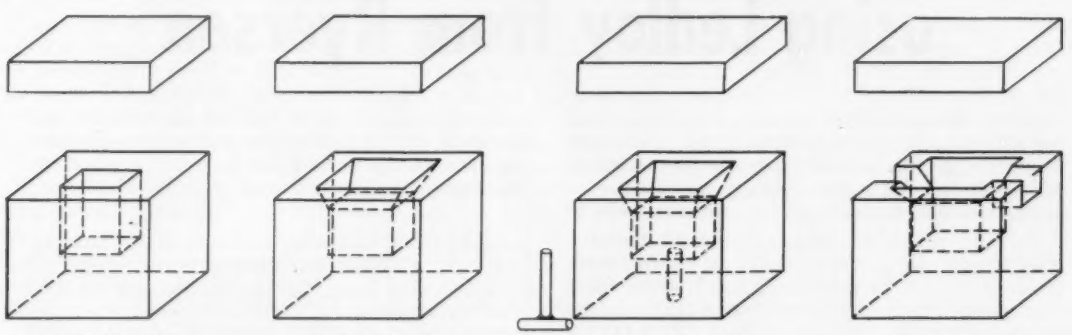
9. If possible, use pedals to leave hands free for loading, unloading and other work. See if the parts can be unloaded by gravity.

10. Make the dimensions of your jigs, nests, holding devices, etc., so that maximum-sized parts within permissible tolerances with total accumulative maximum dimensions are easily inserted and removed from jig.

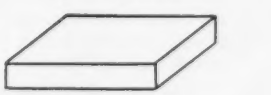
11. Make as many parts as possible integral with the jig to avoid loss during operation and storage.

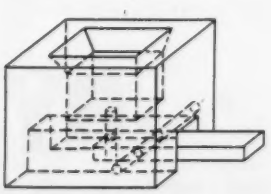
12. Make the jig or fixture as light as possible, by removing all excess material consistent with necessary rigidity.

Times for Loading and Unloading Jigs



No. 1—0.106 Min. No. 2—0.102 Min. No. 3—0.093 Min. No. 4—0.063 Min.





No. 5—0.057 Min.

NOTES:

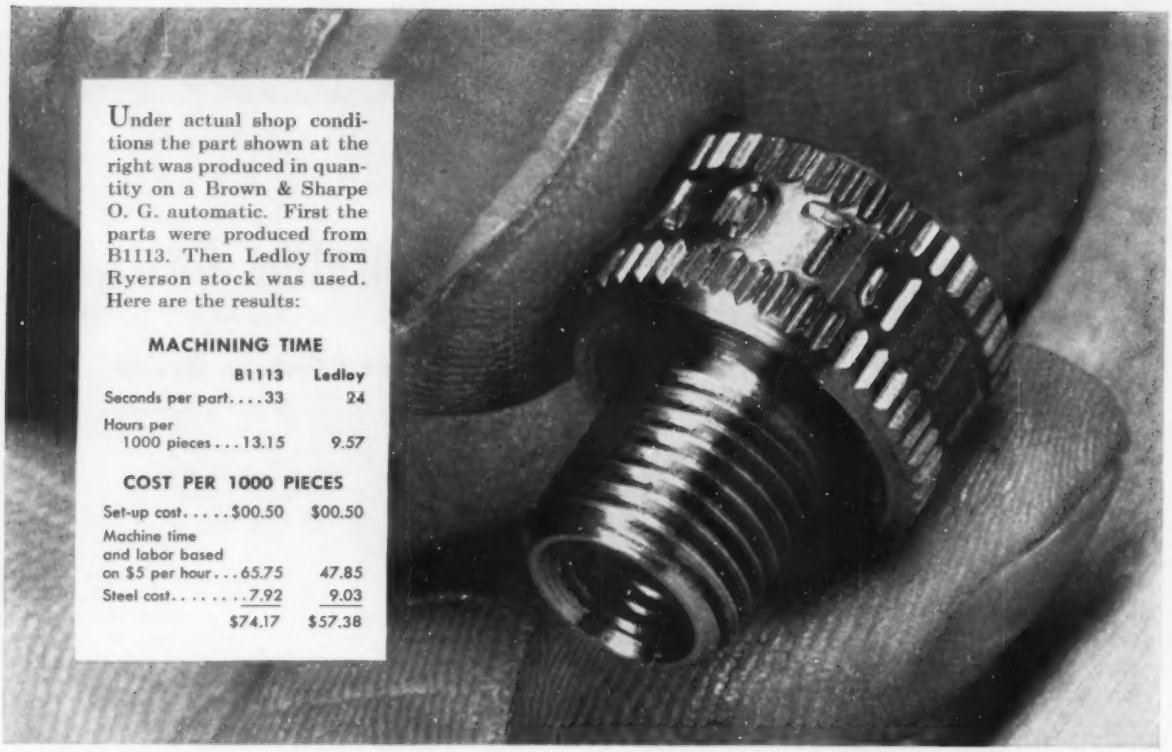
No. 1—Part is a snug fit in nest, jig must be turned over and shaken to remove workpiece. No taper in nest makes difficult the taks of positioning the part.

No. 2—Tapered opening to nest makes work positioning easier

No. 3—A knockout pin helps to remove the part

No. 4—Finger openings are provided at sides of jig

No. 5—A lever-operated knockout and a tapered nest make part removal easier than in other jig designs



Under actual shop conditions the part shown at the right was produced in quantity on a Brown & Sharpe O. G. automatic. First the parts were produced from B1113. Then Ledloy from Ryerson stock was used. Here are the results:

MACHINING TIME

	B1113	Ledloy
Seconds per part	.33	24
Hours per 1000 pieces	13.15	9.57

COST PER 1000 PIECES

Set-up cost	$00.50	$00.50
Machine time and labor based on $5 per hour	65.75	47.85
Steel cost	7.92	9.03
	$74.17	$57.38

$16.79 saving on 1000 parts using Ledloy from Ryerson

In shops throughout the country Ledloy is effecting similar savings—establishing its superiority over all other free-machining steels. Since switching to Ledloy, one shop reports an increase in production of 54%; another 43%; still another 75%!

On the average, this remarkable lead-lubricated steel brings net savings of 25% or more everywhere it is used by permitting much faster feeds and speeds (25 to 50% faster than B1113) and by extending tool life as much as 200%. Still Ledloy retains the strength and other good qualities of an open hearth steel. Machines to an unusually clean, smooth finish—bends, crimps, swedges or rivets easily.

You can get quick shipment of Ledloy in any quantity from your nearby Ryerson plant. Rounds, squares and hexagons are immediately available in a wide range of sizes. And your Ryerson representative will be glad to give you all the engineering data on this remarkable free-machining steel. We suggest you order a trial quantity now.

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TALKING SHOP

Air Test Cart

AIR MOTORS are checked periodically for efficiency and lubrication in the plant of Ryan Aeronautical Company, San Diego, by a test cart. Thus higher productivity and longer life is obtained from pneumatic tools. Formerly, pneumatic tools were not overhauled until loss of efficiency was obvious. Instruments on the cart include a tachometer, a flow meter, a filter and test gage. Each motor is tested under actual load conditions. The cart was designed and built by Ryan plant engineers.

In addition to testing and lubricating, the cart also may be used for cleaning if tests being made indicate molybdenum sulfide can be used as a lubricant which would not be washed away by the cleaning solvent. If not, cleaning will continue to be done in the tool crib, according to Compressed Air & Gas Institute.

Setup Time "Slugged"

LIMITING FACTOR in using multiple-spindle automatic bar machines for short runs is the relatively long setup time. Unless the quantity required is relatively large, the extra setup time will offset reduced production time gained by going from a turret lathe to an automatic.

Fulton-Sylphon Div of Robertshaw-Fulton Controls produces more than 3200 models of temperature-control valves. To keep inventory down the company produces parts in lot sizes averaging 1000 pieces.

With a "setup slug" they have been able to cut setup time on Warner & Swasey multiple-spindle automatics to the point that a number of bellows components can be produced at a saving. This setup slug is a completed part that has not been cut off from the stub end of bar stock. It is clamped in one of the collets and indexed to each position. Cutters are set approximately to this finished part and the machine is loaded with bar stock. After a few parts have been run off and inspected, exact settings are obtained by micrometer adjustments on the cross slides. Savings in setup time are said to average 40% on threaded parts, 50% on others.

Broaching Ti

TESTS ON TITANIUM and its alloys at at Univ of Mich, reported to the ASME, indicate broaching tools should have low rake angles to prevent digging in. A rake of 5° was better than 20°. Relief angles, in contrast, should be greater than usual for ductile materials. Relief of 5° was satisfactory. Rise per tooth of 0.002 to 0.005 in. was good except in broaching Ti-150B, when 0.002 was better than 0.005. Finishes were better than those for steel, being particularly good for RC-130B at either 0.002 or 0.005 in. rake. Values of unit-hp were comparable to those for steel.

$2,000,000 A Ton

SHEETS of 4-79 Ni steel ⅛ thousandth of an inch thick have been developed by Armco Research for small memory cores in high-speed electronic computors. The steel, containing 4% moly and 79% nickel, is not particularly expensive, but by the time the rolling is completed it costs $2,000,000 a ton, principally because 16 sheets pressed together would approximate only the thickness of a human hair.

Anti-Ring Drive

CONVAIR, Forth Worth, has begun a drive to see that sentiment does not interfere with safety. It has now warned employees to remove rings and bracelets before they start to work, because two employees lost fingers in as many months because they were wearing rings. Commonest cause is catching of rings when workers are letting themselves down from an elevation — leaping from work stands, for example. Another frequent cause is catching of a ring in machinery, a familiar shop-accident cause.

Single-Point Boring

CLOSER TOLERANCES and the lack of good mechanics is forcing a rejuvenation of single-point boring. Parts once bored in a jig are now in many cases drilled, tapped and reamed as always, but boring holes are plugged because operators presently available are not skilled enough to do the job in a drilling machine. Boring is done on a horizontal or precision boring machine with a single-point tool. Another factor has been the increase in jobs involving tough materials in thin-section, complex shapes—an example being monel gyro cases for aircraft instruments. Single-point boring gives required tolerances and finishes.

Utopia

SICKNESS EXPENSES fall lightly on the employees of the George Fischer works, Switzerland, where the company, in cooperation with another firm, owns and operates a convalescent and rest home. Not only is sickness taken care of by social service fund, but even legal matters and financial aid for purchase of a home, furnishings, or heavy debts is provided. A complete apprenticeship course is offered, and vacations and skiing expeditions are arranged for employees' children. College courses are financed, and old-age and retirement benefits are provided. All kinds of recreational facilities are made available, including courses for home-makers, lectures on gardening continuation courses for foremen, theatrical performances, concerts, and social evenings.

Johann Conrad Fischer (1773-1854), founder, was one of the first to delve deeply into the mysteries of iron. His saying, "There is 24-carat iron, just as there is 24-carat gold," typifies his deep interest and determination to produce the finest materials. The story is told in a beautifully prepared volume just produced by his company to tell the history of a century and a half of achievement.

News of Metalworking

Budget for '55 Cuts Vehicle, Ammunition Procurement, But There'll Be More Planes and Guided Missiles

WASHINGTON—Defense spending —reduced $2.1 billion for fiscal 1954 —will be cut even more in fiscal 1955. That's the story in the new Eisenhower budget for the Defense Dept (see table).

Total military expenditures will fall from this year's $41.5 billion to $37.5 billion. Spending should decline more sharply in succeeding years, since the administration has asked for only $30.9 billion in new funds for all military services in fiscal 1953, compared to $41.5 billion appropriated for this year.

Though total spending will fall, fiscal 1955 expenditures for aircraft, shipbuilding, electronics, guided missiles, construction and research and development will continue at close-to-record peacetime levels. Spending for aircraft will actually be heavier than in any year since World War II. Declines will be biggest in procurement of vehicles, ammunition, and soft goods.

Next year's decline in defense spending, said the President in his budget message, "reflects the dynamic long-range plan recommended by the Joint Chiefs of Staff." The added emphasis on airpower is in line with plans for improving continual defense against possible enemy attack.

Eisenhower added that previous military budgets have been feast or famine affairs, depending on the world situation. In peacetime, budgets were reduced; in wartime, financing was ignored. The present budget, on the other hand, "provides for continued maintenance of strong military forces within the national economy."

The new budget will support an Army of 17 divisions and 18 regimental teams. That's two less divisions than the present force. The Navy will be cut from 1124 ships to 1078—mainly in support vessels—and from 13,130 Naval aircraft to 12,940. The Air Force will go from 21,000 planes organized in 115 air wings to 22,900 in 120 wings. The Marines will stay at three divisions and three air wings.

Over the next three years, the Pentagon plans to hike total aircraft from about 34,000 to over 40,000—a target of 137 air wings in 1957. Only a third of existing aircraft are jets: the goal is for more than half jets. Of the 137-wing force, 126 will be combat units. Goal for Naval aircraft is 16 carrier air groups and 15 anti-sub squadrons.

Expenditures for the military aid program will decline from $4.2 billion this year to $3.5 billion next year. New legislation may add $700 million to the 1955 figure, however. The administration seeks $2.5 billion in new funds for military aid: $3.8 billion was voted for this year.

Here's how appropriation requests for major procurement and production stack up:

- **Navy:** aircraft $1.9 billion, ships and harbor craft $1.1 billion, combat vehicles $53 million, support vehicles $4 million, artillery $13 million, weapons $24 million, ammunition $263 million, guided missiles $136 million, electronics and communications $114 million; production equipment and facilities $38 million, other major procurement and production $109 million.
- **Air Force:** aircraft $2.2 billion, support vehicles $53 million, ammunition $250 million, guided missiles $265 million, electronics and communications $305 million.
- **Army:** none. (The Army has not broken down its fiscal 1955 spending figures beyond the "Procurement and Production" category listed on the table.) The following, however, is classification of the Army's total procurement and production funds available for obligation next year: total $2.5 billion, major equipment (tanks, guns, vehicles, etc) $1 billion, ammunition and guided missiles $1 billion, industrial mobilization $400 million.

Comparable figures this year: total Army procurement and production figures available for obligation: $2.3 billion, major equipment $1 billion, ammunition and guided missiles $1 billion, industrial mobilization $350 million.

SAE AIRCRAFT FORUM TO STRESS ECONOMY

NEW YORK—"Economy in Aeronautic Production" will be the theme of the Society of Automotive Engineers' Second Annual Aeronautic Production Forum to be held here at the Hotel Statler April 12.

More than 800 top-ranking engineers, management and production men are expected to attend the session, which will feature seven panels on: quality control, production control, metallurgical and chemical processing, cost control, new manufacturing methods, effect of lead-time and engineering changes on costs and personnel relations.

PROCUREMENT BREAKDOWN BY SERVICES 1954-1955

(millions of dollars)	NEW AUTHORIZATIONS 1954	NEW AUTHORIZATIONS 1955	EXPENDITURES 1954	EXPENDITURES 1955
INTERSERVICE				
Reserve tools, facilities	$250	none	none	$100
Ship construction	none	$50	none	5
ARMY				
Procurement & production	$3225	none	$2870	$3650
NAVY				
Aircraft, related procurement	1379	1987	2400	2450
Ships and facilities	878	937	1040	855
Ship construction	57	58	70	54
Shipbuilding and conversion	719	1041	765	775
Ordnance and facilities	799	626	1100	825
Ordnance for new construction	none	none	35	1
AIR FORCE				
Aircraft	3495	2760	6900	6700
Non-Aircraft	600	735	726	1075

HOW THE PROCUREMENT PIE IS SLICED

ranking prime contractors since Korea, in millions of dollars

	July 1950-Dec 1952	Dec 1952-June 1953	Total since July 1950
General Motors Corp	$5285.2	$1810.6	$7095.8
Boeing Airplane Co	1998.6	2404.8	4402.9
General Electric Co	2855.4	603.8	3459.2
Douglas Aircraft Co	2123.9	743.9	2867.8
United Aircraft Corp	2336.6	479.8	2816.4
Chrysler Corp	2151.9	48.0	2199.9
Lockheed Aircraft	1911.8	240.3	2152.1
Consolidated Vultee	973.3	1098.8	2072.1
North American Aviation	1473.7	457.9	1931.6
Republic Aviation	1456.6	421.1	1877.7
Curtiss-Wright Corp	1222.7	523.5	2072.1
Ford Motor Co	1658.2	—*	1604.8
American Tel & Tel	1197.6	294.2	1491.8
Westinghouse Electric	1100.0	248.2	1348.2
Grumman Aircraft	1049.1	—*	1043.6
Northrop Aircraft	733.6	265.4	999.0
Bendix Aviation	746.7	203.8	940.5
Sperry Corp	755.8	164.6	925.4
Kaiser-Willys	317.6	580.0	897.6
American Locomotive	1213.3	—*	812.8
McDonnell Aircraft	474.5	205.2	697.7
Radio Corp of America	480.4	184.2	664.6
Glenn L Martin Aircraft	438.6	204.6	643.2
International Harvester	565.6	62.9	628.5
Hughes Tool Co	451.6	170.8	622.4

* Contracts cancelled

Procurement Reflects "More Aircraft"

WASHINGTON — Gain made by manufacturers of aircraft and air weapons in the six months from December 1952 to June 1953 in defense contracts reflects the administration's policy of a strong air defense and offense. Companies with little or no aircraft work slipped strongly from their former position (see table above), while such aircraft companies as Boeing, Convair and Martin zoomed to positions near the top. Electronics suppliers like Radio Corp of America, American Telephone & Telegraph, and Westinghouse stayed in their same position. But Ford and American Locomotive Co dropped six to seven notches among the top 25 because of the recent cuts in tank and truck procurement.

AMPHIBIOUS ARMORED INFANTRY CARRIER, the T-59, thunders through trial runs at Food Machinery & Chemical Corp's West Coast proving grounds. Essentially a high-speed land vehicle, the carrier can swim rivers and lakes

FORD REVAMPS ITS TRACTOR DIVISION

DETROIT — Functions of its former Tractor Division have been incorporated by Ford Motor Co into its new Tractor and Implement Division, which will have full responsibility for manufacturing, research, engineering, sales and distribution of Ford tractors and implements.

This integration follows Ford's July 1953 purchase of Dearborn Motors Corp, holder of Ford's tractor distribution franchise since 1946. Dearborn Motors then became Ford Tractor Division.

Irving A Duffy, Ford director and vice president in charge of purchasing, has been named to head the Division. He succeeds Thomas A Farrell, president of Dearborn Motors since 1950, who became general manager of Ford Tractor Division when Dearborn Motors was sold to Ford last July.

BUICK PLANS $ MULTI-MILLION EXPANSION

FLINT, MICH—GM's Buick Motor Division has announced a multi-million-dollar expansion of its production facilities, scheduled for completion by 1955. Buick's expansion is in line with GM's recently announced $1 billion expansion program.

Here's what the expansion money will buy: production of 500 more Dynaflows a day, double present foundry capacity, higher forge shop and axle output, 150,000-sq-ft of added production space in Flint. A large amount will be devoted to purchase of machine tools and equipment for installation in Buick's former straight-eight engine plant, now to be used for production of axles.

MAINTENANCE SHOW DRAWS 21,000

CHICAGO—Upwards of 21,000 registered for the Plant Maintenance & Engineering Show, held here January 24-27. More than 500 machines and products were shown by 400 exhibitors at Chicago's International Amphitheater.

Top drawing cards at the Show were: motor-driven scaffolds, parts and supplies carriers, centrally controlled automatic lubrication systems, combination floor sweepers, scrubbers and vacuum cleaners, business machines, lift trucks and communication systems, Show officials report.

US Boosts Titanium Goal to 35,000 Tons by 1957 As Air Force, Planemakers Put Heat on Congress

WASHINGTON — Political pressure from aircraft manufacturers and Air Force brass has put the heat on the government's titanium expansion program. It's produced these results already:

General Services Administration expects to lure about two new primary producers into business. And it will stimulate facilities expansion of two current producers. The incentives: roughly $75 million worth of advances against future output for plant and equipment, market guarantees on production, fast tax writeoffs.

Plans are to boost titanium capacity to almost 35,000 tons by 1957 —more than double the 13,200-ton capacity now scheduled to be in place by that time.

Office of Defense Mobilization is setting up a special inter-agency committee to "immediately develop . . . a proposed government program on titanium expansion." The implication is that the current 25,000-ton-goal program, doesn't amount to much.

Conflicts With Original Plan

The new expansion conflicts with the government's original plan — to sponsor an embryo titanium industry of about 10 producers using as many as five different processes. Now there will be four or so companies in business with one process — the high-cost Kroll Batch process, which most experts think will be obsolete before the contracts' expiration. In this eventuality, the companies will be protected by a proviso cancelling their indebtedness.

Output Lags Behind Need

The new thinking was prompted by hearings of Senator Malone's Minerals Sub-Committee, which publicized criticisms that titanium production is lagging badly behind requirements. Here is a sample of the testimony:

• Roy Hurley, board chairman, Curtiss-Wright Corp: his company could use 36,000 tons of titanium annually for commercial and military aircraft production.

• William O'Donnell, chief development engineer, Republic Aviation Corp: titanium is essential for high-speed fighter aircraft and for guided missiles now approaching production. In the 1250-2500 mph speed range, there will be serious performance disadvantages if the heavier stainless steel must be used.

• Leo M Harvey, president, Harvey Machine Co: aircraft engine manufacturers could use 50,000 tons of titanium annually and an extra 50,000 tons each successive year—until a minimum annual requirement of 250,000 tons is reached. Airframe makers have reported similar eventual requirements, making a total of 500,000 tons.

• Air Force Brigadier General Kern Metzger, Air Materiel Command: the military services could use as much as 100,000 tons of titanium a year almost immediately.

• Colonel Benjamin Mesick, commandant of Army Ordnance's Watertown, Mass, Arsenal: titanium could reduce the weight of a 28-ton tank to 20 tons: an 81 mm mortar from 50 lb to 22 lb. Other potential Army uses: armor, grenade launchers, bayonets, trenching tools, helmets, heavy artillery. Assuming changes in specifications, potential Army use is about one million tons a year.

Titanium output last year was only about 2400 tons. This year it will reach about 5500 tons. Projected production in 1956 is 3600 tons each by DuPont and Titanium Metals Corp, 6000 tons by Crane Co. DuPont and TMC are the leading candidates for the new GSA contracts—so are Monsanto Chemical Co and Dow Chemical Co.

There's plenty of controversy over the stepped-up titanium program. Many Washington officials are skeptical that defense contractors can really use as much titanium output as they want the government to sponsor. They're also pessimistic about cost reductions in the near future for both smelting and fabrication. And in view of administration talk about defense budget cuts of around $5 billion, it seems unlikely to them that the military could afford to buy all the titanium products the brass says is needed.

The Bottleneck: Cost

Cost is the bottleneck in titanium. Because of bugs in technology, even current production is behind schedule. Reason: it's difficult to produce titanium ductile enough and pure enough to meet specifications of aircraft manufacturers, who use just about all available titanium for fire walls, shrouds, cowling, skin-sections and compressor wheels and blades for supersonic planes.

Since the expansion goal was set two years ago, Office of Defense Mobilization and General Services Administration officials claim they've been unable to find new producers far enough developed to justify heavy advances of government money. And they've been reluctant to put all their eggs in one basket—the Kroll Batch process—in which titanium tetrachloride is reduced to metallic "sponge" by reaction with molten magnesium. The price of primary titanium produced by the Kroll Batch process is $5 per lb.

Several companies, notably Union Carbide & Carbon Co and Kennecott Copper Corp, are rushing work on lower-cost continuous processes. Chances are they may be able to start operations with their own capital in the near future. But they would still want Washington's other production incentives.

Low-Cost Melting Needed

A more economic reduction process than the Kroll method would reduce the price of sponge, but an equally important task is to cut fabricating costs. Titanium mill products like sheet, bar and rod now average $15 per lb. The big trick would be to develop an economical melting process to form ingots. It takes about 2 lb of titanium sponge to make 1 lb of mill product. And though you make as much scrap as finished product from the sponge, only about 10% of the scrap is being used.

Research in High Gear

The answer to all these headaches lies in research and development work, now going ahead full blast. Excluding classified projects and application and prototype developments, titanium research and development projects conducted by government and industry now number 190, according to a recent Army Ordnance compilation. These range from reduction and chemical thermodynamics to alloying and its effects, and to machining and grinding.

Research in machining and grinding titanium has been or is being

sponsored by Kennecott Copper Corp at New York University, and at Battelle Memorial Institute; by Army Ordnance at the University of Michigan and MIT; and by the Air Materiel Command at Michigan, MIT and Curtiss-Wright.

Army Ordnance's project at the University of Michigan's Engineering Research Institute is the most comprehensive. Its objective: to investigate the machinability of commercially pure titanium and three titanium alloys.

Reuslts of this research project are revealed in seven reports expected to be available from the Offices of Technical Services, Commerce Dept, Washington, shortly. They are:

"Preliminary Report on the 'Cutting' Characteristics of Titanium," "Mechanical Properties of Machinability Program Work Materials," "Effect of Side Rake Angle on Tool Life in Turning Titanium," "Cutting Speed vs Tool Life When Shaping Titanium with High-Speed Steel Tools," "Power Hacksaw Operations on Titanium and Its Alloys," and "Tool Life vs Nose Radius When Turning Titanium."

Also available from OTS is a new bibliography of titanium literature, priced at $3: supplement, $1.

Metalworking Panels at Tool Show

DETROIT — Thirty top US metalworking experts will take part in panel quiz sessions dealing with production planning, automation, precision control, milling and workholding problems at the 1954 American Society of Tool Engineers Industrial Exposition (Tool Show), Philadelphia, April 26-30. The experts will participate in five separate panel sessions, each dealing with a particular phase of the Tool Show's "Tooling for Competition" theme.

- **Production Planning** discussion will be held the afternoon of April 26 at the Philadelphia Convention Center and will cover design and use of operations process sheets, flow charts, instruction sheets, machine-loading schedules, scheduling, routing, dispatching and paperwork.
- **Tooling for Automatics** panel April 27 will discuss production tooling on screw machines, turret lathes and single or multi-spindle automatics.
- **Milling Problems** panel discussion April 28 will try to provide the answer to the problem of "How to Lick Your Tough Milling Problems" and will be held at 8 pm in the Bellevue-Stratford Hotel.
- **Inspection Improvements** discussion at the Convention Center on April 29 will include such topics as quality control, gaging and non-destructive testing.
- **Improved Workholding** panel on April 30 at the Convention Center will talk over "How Others Have Improved Their Workholding Ways and Means," and will include discussion of jigs, chucks and collets.

BRIDGEPORT BRASS TAKES OVER EXTRUSION PLANT

ADRIAN, MICH — The Air Force's huge aluminum forging and extrusion plant here is changing hands again.

On February 15, Bridgeport Brass Co will take over the 800,000-sq-ft facility on an indefinite-contract basis. Bridgeport's new Aluminum Division will pay the government a fixed fee for each pound of material produced at Adrian, with Air Force work continuing to have top priority. As yet, Bridgeport has been awarded no major Air Force or commercial contracts for the Adrian plant.

The plant was formerly operated by Bohn Aluminum & Brass Corp, Gerity-Michigan Mfg Co, and Reynolds Metals Corp. Under Gerity-Michigan management, it served as a manufacturing methods pilot plant, with other companies using the giant extrusion presses on a fee basis.

Work Force May Reach 1000

Under Bridgeport management, the plant's work force may ultimately reach 1000, according to Bridgeport President Herman W Steinkraus, who claims the plant has an output potential of $60 million a year. Last year the plant produced about $1 million a month.

The plant's 16 extrusion presses include: one 5500-ton press, three of 3850 tons, four of 2750 tons, four of 2400 tons and four of 1650 tons. And a 17,500-ton forging press, one of the largest of its kind in the country is installed in the plant. This press exerts 35-million-psi pressure, stands 88 ft high, is 34-ft wide.

TWO NEW WRINKLES AT NORTHROP AIRCRAFT, Hawthorne, Calif, are saving inspection time and money. Left: glass fiber cloth master templets are used to check wing panels and other large surfaces. The transparent overlay is laid on the surface to be inspected and lines on the templet indicate the proper fastener for each hole. Right: photographs (small pile indicated by arrow) retouched to emphasize critical inspection points are used as a substitute for large unwieldy blueprints (large pile). Both of the inspection items shown here have effected 50% savings

Automatic Machine Control for Job-Lot Production Seen as Outgrowth of GE Electronic System

NEW YORK—Automatic control for machine tools has moved another step with development of a device to position machine elements accurately to 0.001 in. Developed by General Electric at their electronics laboratory in Syracuse, NY, first application is to a standard Wiedemann turret punch press.

Holes of varying diameter must be punched in many different patterns to form chassis for electronic devices. The turret punch press mounts a tool-steel templet that the operator positions under an index pin, shifting the work to the proper position under the turret. The turret can be revolved to bring the proper size of punch into position.

Counting the Thousandths

With automatic operation, the templet is dispensed with and the work is positioned according to instructions punched in an acetate card. Hole locations are determined in terms of x and y coordinates and the data punched in the card, along with information as to hole diameter. This card becomes the memory unit of an electronic digital computer.

Carriage movements in the two directions are obtained by two identical power units. Each consists of a pneumatic cylinder to move the carriage rapidly in the required direction directly coupled with a hydraulic cylinder to control the movement. As the piston nears final position valves in the hydraulic piston close, slowing the movement, with the final valve closing as exact position is reached.

Each control unit has a glass bar scribed with 0.0005 in. wide lines spaced on 0.001 in. centers. This grid moves behind a short grid scribed in exactly the same way. A light source projected through the two grids onto a photo cell produces alternate light and dark for each 0.001 in. of grid movement. The electronic digital computer counts the number of thousandths of grid movement (identical with work movement) and from instructions of the memory card determines the direction and the stopping place for each new position.

Assembly Machine Next

General Electric developed the machine control under a Signal Corps contract for the development of automatic methods to assemble and test electronic circuit sub-assemblies.

Next step, now in process, is application of the same principle to an automatic components assembly system. This system will place from 10 to 50 standard components on printed wiring boards at a rate of 30 per min. Eventually it will provide for preparation and testing of components, transporting them to the assembly machine, and for soldering and testing the completed sub-assemblies. This entire system, expected to be completed in 1955, will provide automatic assembly of electronic sub-assemblies controlled by punched cards. Design changes will be made by changing cards. On the present punch press, data for a card can be computed and punched in less than 30 min. Printed wiring boards for the assembly machine can be punched on a version of the present automatic punch press.

For Job-Lot Production

Beyond this, there seems no reason that this device cannot be adapted to a variety of machine tools, to accurately position work, tool, or machine controls to 0.001 in.

This approach seems to be most promising for job-lot machining or assembly operations. It should reduce setup time to a minimum in running lots of 10 to 50, an area in which the developers say about 75% of metalworking operations fall.

FRANCE'S HEB COPYING LATHES TO BE MADE HERE

NEW YORK — France's well-known HEB automatic copying lathes will shortly be made in the United States under terms of an agreement made here by Serge Fouquet, director of the Machine Tool Dept of H Ernault Batignolles of France, with Industrial Metal Products Corp of Lansing, Mich, longtime suppliers of machine tools to the automotive industry. Under the new arrangement, Industrial Metal Products Corp will manufacture HEB lathes for the US market in complete conformity with American JIC standards.

Sole distribution and sales of the copying lathes will be handled through dealerships established by H Ernault Batignolles' US sales subsidiary, HEB Machine Tools, Inc, of New York City, under the management of Max Sebba.

AUTOMATIC PUNCH PRESS is controlled by electronic digital computer at rear. Work can be positioned to 0.001 in. from data supplied by punched acetate card. Carriage is moved by pneumatic cylinder, control head actually counts the number of thousandths table moves, stops at thousandth mark specified

HIGH-HELIX CARBIDE-BLADED END MILL removes 61½ cu in. per minute of 2340 nickel steel (R_c28) in tests at Long Beach, Calif, Naval Shipyard. The cutter, a 3-in. Helicarb straight-shank mill in an adapter on a 50-hp Cincinnati miller, was operated at 416 rpm, with cut 1-5/32 in. deep and table feed of 19 ipm. These mills, using the twisted carbide blades developed by Boeing Seattle and announced last year, are now made by Sonnet Tool & Mfg Co, Hawthorne, Calif. They have been applied by Convair in milling aluminum spars at feeds of 300 ipm and 3600 rpm for a 7/16 x 2⅞-in. cut, to reduce milling time 75%

President's Recommended Tax Revisions Up Before House This Month

WASHINGTON — The President's tax recommendation package centers around stimulating investment, and his major request is for a better break on tax amortization for new capacity, to start in 1953.

New Accounting Headaches?

One recommendation, if it is adopted, will give corporation executives some late nights in the office. Eisenhower wants to spread out corporate income tax collection in a manner that would force company officials to estimate a full year's profits before the year is over. By 1955, a corporation's entire tax liability for one calendar year would be due in equal installments in March and June of the next year. Then Eisenhower wants corporations to make additional payments in 1955—one in September and one in December. The payments would be 5% of estimated profits for calendar 1955. They would be increased gradually to 25% over a four-year period.

The President's plan to liberalize write-offs of investment would allow businessmen to depreciate two-thirds of the cost of new plant and equipment in half the product's estimated life. Under present rules, half the cost is written off in half the life.

Liberal Loss Carry-Back

The President also suggested a liberalization of the loss carry-back provision. At present, a company running in the red is allowed to carry its loss back one year as an offset against prior earnings and as a means of giving tax relief to companies temporarily in trouble. The President would like to allow companies to carry losses back two years. He would keep the present five-year carry-forward of losses—designed particularly to aid new and expanding companies. Both provisions are considered investment stimulants.

House Ways & Means Committee will have a tax bill ready for debate in the House late this month. The bill will contain most or all of Eisenhower's recommendations.

Metalworking Abroad

(McGraw-Hill World News)

ARGENTINA—David Brown of England plans to build a tractor plant here, taking advantage of Argentina's new foreign investment law, which guarantees foreign firms bringing equipment into the country the right to take profits out.

IRAQ—Federation of British Industries will hold a trade fair in Baghdad October 25-November 8. Machine tools, agricultural machinery, building equipment and television (for the first time in Iraq) will be demonstrated.

AUSTRALIA—A small, delta-winged pilotless rocket-powered experimental aircraft is in an advanced stage of development at the Anglo-Australian Guided Weapons Project, Woomera, South Australia. The pilotless plane will be operated from mobile launchers and is expected to operate at 12-mile height.

RUSSIA—The official Communist party organ, Pravda, claims that plants operated under the Ministry of Transport and Heavy Machine Building are idle at the beginning of the month, then try to catch up with quotas in a hurry. Says Pravda, "almost half of the total monthly output is accomplished in the last 10 days."

WEST GERMANY—Machinery imports in 1953 were valued at around 340 million marks in 1953, nearly 15% more than in 1952. Machine tools, textile and office machinery accounted for 50% of all imports.

BULGARIA—For the first time in this country's history, heavy industry (agricultural machinery, electrical equipment and shaped steel) out-produced agricultural economy. Industrial output in 1953 was about 12% ahead of 1952.

INDIA—England's F Perkins, Ltd, will set up diesel-engine manufacturing facilities here. The company already has an assembly plant in India, makes some components here, and will gradually transfer manufacture of complete P6V engines from England.

THE NETHERLANDS—Metalworking price levels are declining sharply here, and new orders are hard to come by. Example: shipyards now have three-year backlogs, compared with five-year backlogs in 1951.

Standby Production Lines + Stockpiling =

ST LOUIS—Standby production lines balanced by adequate stockpiles of defense goods are an "insurance policy" against sudden aggression by America's enemies, Brig Gen John B Medaris, Chief of Industrial Division, Army Ordnance, told members of the Ordnance Association at a meeting here January 7.

Ordnance today has four objectives toward achieving its goal of providing "the world's best Ordnance for the world's best soldiers," the General said. They are: (1) to produce and procure modern Ordnance to meet immediate needs of the Services and, to some extent, those of allied nations, (2) to reconstitute reserve stocks, (3) to expand research and development, and (4) to maintain an industrial base from which production can be rapidly expanded in case of all-out war.

The latter objective, according to General Medaris, presents a "serious challenge" in that the US must strike a balance between the stocks on hand and standby productive capacity that can produce on short notice "with some of that capacity, at least, warm and operating at idling speed."

The current Department of Defense policy is built around that concept—the "floating M-Day," wherein the goal is a "desirable state of M-Day readiness for an indefinite M-Day." But, General Medaris added, the idea is to work toward that state, not quite reaching it, but ready to do so quickly if need arises.

Important as Stockpiling

In order to accomplish this, he said, the US must maintain production equipment necessary to maintaining a production base capable of rapid expansion in the event of all-out mobilization. Maintaining such a base is as important as stockpiling, and must be a primary objective, General Medaris said.

Three Preparedness Essentials

Three things are needed to maintain such capacity, he said:

- All necessary equipment to produce an essential military item must remain under control of the contractor. This is a means of pinpointing responsibility and keeping the equipment under the care of men who know how to use it and how best to maintain it. And with contractor control, exact storage and maintenance costs for a given year can be estimated exactly. Too, maintaining the same geographical position of operations minimizes the dislocation of personnel — one of the great fiascos of World War II.
- Industry (the contractor) must accept responsibility for such conditions of storage and maintenance as will assure ability to resume production at short notice.
- Resulting contractual arrangements must be economical, with the total bill well within the nation's ability to pay on a continuing basis.

The foregoing applies to equipment left in place, either preserved or under power; equipment removed from its production location but stored in the same building; and equipment removed, preserved and stored in some other building under the contractor's control.

Central Government Storage?

Still another method of storing equipment is to remove, preserve and store it in centrally located government warehouses. But General Medaris warned, this method immediately impairs US production potential and must be supported by huge reserve stocks.

In order to determine just how to

Hot Extruding Aluminum Fan Blades

LOS ANGELES — Aluminum wheels and fans from 2- to 4.5-in. dia are extruded hot to finished size in a special 1100-ton Lake Erie press at AirResearch Mfg Co of Ariz, Div of The Garrett Corp.

A ram force of 350 tons and a die clamping pressure of 750 tons are concentrated in the 2- to 3-in. area of the wheel hub. Ram speed is 390 ipm. Only machining necessary is on the hub bore and OD. Extruded blades have better grain flow and are stronger than former blades milled to contour on a duplicator—important for wheels operating to 100,000 rpm.

Erratic die temperatures are prevented by three heaters in the top die, two in the bottom die, all thermostatically controlled. Highly stressed insulation pads keep die heat from affecting press.

ALUMINUM SLUGS preheated in the oven to 920 to 950 F, are placed in press for extrusion. Excessive slack in press was reduced by large guide posts, one of which can be seen in press at right

Sound US Defense, Ordnance Group Told

place any given production line on a standby basis, these factors must be considered:

- Whether the end-item is complex and requires long-lead time.
- Cost and labor involved in removal, and whether removal will impair effectiveness of the equipment. For example, a small lathe can easily be moved, but it is a major job to relocate a furnace or a heavy press.
- Whether the contractor is hard-pressed for storage space.
- Will the plan permit production resumption within 90-120 days?

Another factor to consider is that dollar investment is impaired 35% when a line is taken out of position. And for each day it takes to get a line back into operation, a full day's production must be laid away in mobilization reserves, including a generous allowance for tie-ups.

Progress Already Reported

Some progress in the standby program has already been made, General Medaris reported, citing the Ordnance Tank-Automotive Center in Detroit, where it is planned to store about 80 packages of special tools, jigs, dies and fixtures, valued at $615 million. The initial storage cost is expected to run about $42.5 million, or 7% of their value. Yearly storage maintenance costs will be about 1% of total value.

It is expected, General Medaris said, that these production packages will remain good for at least 10 years, because the tools are of types not likely to be rendered obsolete within that time.

The Plan in Operation

GM's Cadillac Division has agreed to maintain the Cleveland Tank Plant when it eventually closes down. Machines will be kept in place, ready to roll.

Studebaker has already stored $1.3 million in government-owned tools at its South Bend plant, where 2½-ton truck production ended early in September. Studebaker has leased the remaining $200,000 worth of tools for civilian vehicle production. The rental income on this defrays storage costs on the remainder of the tools.

Control of tools under the standby program presents an immense and complex problem. To solve it, Ordnance has set up a Production Equipment Records Unit at Rock Island, Ill, Arsenal. Here in one central place, records will be readily available on the location, kind, make, size, age, capacity and past usage of every tool, whether in use or in storage. The function of this unit is being extended to keep records on all Army-controlled equipment.

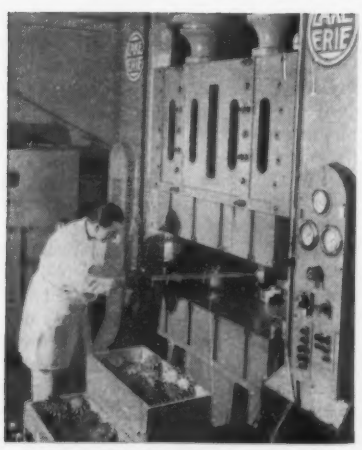
Too, Ordnance arsenals and other centers are now determining what facilities now in production, or formerly in production, are essential to mobilization.

Thus, according to General Medaris, the standby program "is in essence an insurance policy. The dividends will be high if we collect. And the premiums are a small price to pay for the protection afforded."

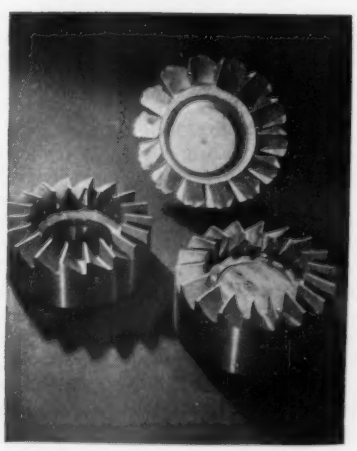
1953 Best Since Korea

General Medaris prefaced his talk by saying that 1953 was "a year in which we saw our painstaking production plans of previous years brought to their highest fruition." Not only did 1953 achieve the highest rate of Ordnance production since the outbreak of Korea—it was a year in which the price of Ordnance equipment in many fields, particularly in ammunition production, was reduced sharply, he concluded.

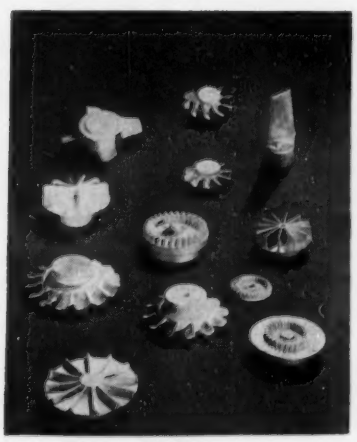
To 0.001-In. Tolerance In 1100-Ton Press



100 FANS PER HOUR are extruded to finished size in this setup, replacing hand duplicating method



DIES for axial-flow fan are shown with extrusion. Blade tolerances are held to 0.001 in.

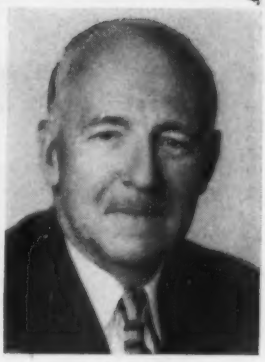


TYPICAL FORMS extruded from hot slugs by AirResearch from 14S aluminum alloy

Swan E Bergstrom

L F Nenninger

Carl Stugard



E D Vancil

Names in the News

Cincinnati Milling Machine Co has announced the formation of a Machine Tool Division, which will be the largest of the three broad divisions of the company covering both standard and special machine tools. **Swan E Bergstrom,** vice president and a director of Cincinnati Milling, has been named manager of the Machine Tool Division and will be responsible for all its activities, including engineering, manufacturing, and selling. **L F Nenninger,** formerly works manager, will be Mr Bergstrom's assistant. The Machine Tool Division will include a Special Machine Tool Division with **Carl Stugard,** formerly manager of Cincinnati Milling's Chicago regional office, as manager. **Ed Rivoira** has been promoted to manager of special machine tool engineering, and **Al Dall** becomes manager of standard machine tool engineering and development. **A T Blackburn** has been promoted to works manager of Cincinnati Milling to replace Mr Nenninger, with **Fred Miller** taking Mr Blackburn's place as general superintendent.

The Machinery Division is the second broad division of Cincinnati Milling's new setup. This division, which will be of increasing importance, will handle the company's Flamatic machines, Hydroform units and contract machinery and allied equipment. **E D Vancil,** heretofore manager of engineering for Cincinnati Milling, has been appointed manager of the Machinery Division. The former manager, **D M Strauchen,** who has retired, is to be a consultant to Mr Vancil. **Hayward Gay,** vice president of the parent company, is continuing as manager of the Products Division, which will constitute the third of the three broad divisions.

Burt Heinrich has been named plant manager of Michigan Forging Co, Dearborn, Mich. His new responsibilities include completion of an expansion program to provide a greater range of forging capacity for the company. For the past six years Mr Heinrich has been plant manager of Ford Motor Co's Forge Plant at Canton, Ohio.

Charles H Carroll, formerly director of purchasing, Ford Motor Co, has been named director of the purchasing office, manufacturing staff. Mr Carroll joined Ford in 1918 as a steel buyer; in 1941 he was placed in charge of production materials purchases; nine years later he was made general purchasing agent of production parts and materials, and in 1952 was appointed to the post he held at the time of his promotion. Until Mr Carroll's appointment, all staff purchasing activities were directed by **Irving A Duffy,** vice president, purchasing, who has been named vice president and general manager of the expanded Tractor & Implement Div. This organization will incorporate all functions of the former Ford Tractor Div, and will maintain its headquarters at Birmingham, Mich. **Thomas A Farrell,** vice president and general manager of the tractor division, has resigned. Mr Duffy joined Ford in 1949 as purchasing director; he was named a vice president and member of the administration committee, and a year ago was elected to the board and the executive committee.

Ray C Reinhartsen, vice president and sales manager of Onsrud Machine Works, Chicago, has been named executive vice president and general manager. **George M Campbell,** secretary, has been appointed a vice president.

Walter Johnson has been appointed manager of Ford Motor Co's Canton, Ohio, Forge Plant, and **R E Skinner,** assistant. Mr Johnson, who has been production manager at the plant, succeeds **Burt Heinrich,** resigned. Mr Skinner has been serving as technical assistant to the general manager of the company's Chassis Parts Div.

John H Romann has been elected president of the Prescott Co, Menominee, Mich, succeeding the late **James A Hamilton.**

John E Brennan, general manager of Chrysler's Jet Engine plant, has been appointed general manager of Chrysler's newly-formed Automotive Body Div; facilities for the new division were acquired from Briggs Mfg Co (*AM*—Jan 18 '54, p284). **George W Drysdale,** former vice president and assistant to the president of Briggs, has been named production manager; former Briggs Vice President **Joseph D Quinn** has been appointed his assistant. **Clifford B Doty,** Briggs vice president in charge of engineering, has been assigned the post of chief engineer. **Ernest W Rothaar** has been named master mechanic, and **R A Melton,** plant engineer; both men served in the same capacities at Briggs. **John J Pathe,** former quality control manager of Plymouth Div, has been appointed to the same post with the new division. **Sherman Mitchell,** production superintendent at the Jet Engine plant, has been named general manager of staff executive.

Wallace L Howe

Frederick E Munschauer, Jr

M K Peck

Fred F Roehll

Wallace L Howe has been elected vice president in charge of research and development, and member of the board of Norton Co. Mr Howe has been associated with the organization for 30 years, serving as product engineer, director of product engineering, director of development, and was named director of research and development in 1952.

William A Bauer has been elected president, and **Charles N Sumwalt, Jr,** executive vice president of the Baker-Raulang Co, Cleveland. Mr Bauer, who, since 1951 has been chairman, will retain that post in addition to his new assignment. As president, he succeeds **James W Moran,** who retired Jan 1. Mr Sumwalt was formerly vice president in charge of the company's eastern sales division. Both men will make their headquarters in New York.

Edward J Pratt has been elected first vice president, and **John S Gorski** second vice president of Amco Gage Co, Detroit. Mr Pratt has held the post of general manager for the past year, and Mr Gorski, general superintendent.

Joseph A Cademartori, appointed general manager, Elmes & King Div, American Steel Foundries, as announced in *AM*, Feb 1, p145

Frederick E Munschauer, Jr, has been elected to the new office of vice president in charge of manufacturing and industrial relations of the Niagara Machine & Tool Works, Buffalo. Mr Munschauer will continue as works manager, a post he has held since 1946; he is a Cornell graduate, and has been a member of the firm since 1941.

M K Peck has been appointed assistant sales manager for The Bullard Co, Bridgeport, Conn. Prior to joining the firm in 1949, Mr Peck was associated with the Consolidated Machine Tool Co of Rochester, NY.

Fred F Roehll, national sales manager of Eutectic Welding Alloys Corp, Flushing, NY, has been named vice president in charge of sales. Mr Roehll joined the organization in 1946, and four years later was appointed to the post he held at the time of his promotion.

Robert L Carlstein has been promoted to assistant production control manager at Allis-Chalmers West Allis Works. He joined the company in 1934; since 1949 he has been superintendent of material control. **William H Schrinner,** formerly assistant, succeeds Mr Carlstein.

OBITUARIES

Allen J Carruthers

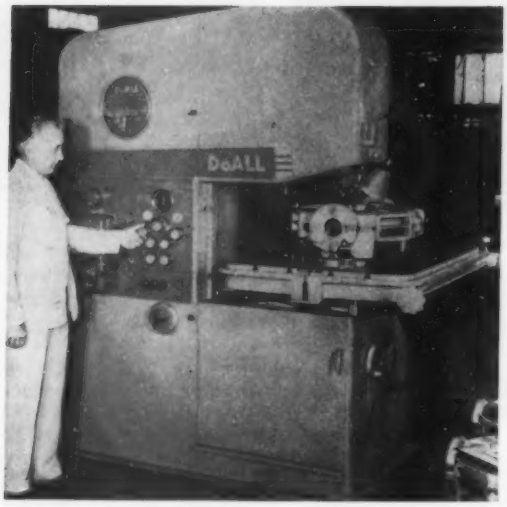
Allen J Carruthers, 50, research engineer for the Greenfield Tap & Die Co, Greenfield, Mass, died Oct 29 after a brief illness. With GTD since 1941, Mr Carruthers was previously associated with General Electric and Westinghouse in metallurgical research and allied fields. He was a member of the American Society for Metals, and past chairman of the Springfield, Mass, chapters of the American Society of Tool Engineers and the American Ordnance Association.

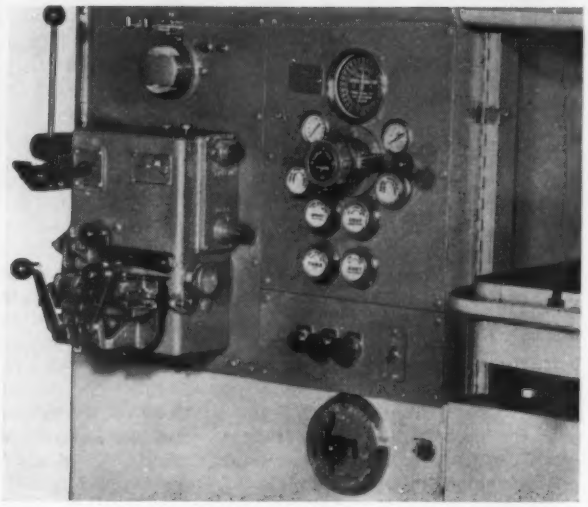
Dr Paul G Agnew, 72, one of the pioneer leaders in standardization in the US, died in New York Jan 8. He served 28 years as secretary of the American Standards Association until his retirement in 1947. Dr Agnew was instrumental in the formation of the International Organization for Standardization, and as a member of the Bureau of Standards' Electrical Instruments section, he had a large part in the development of methods and apparatus for alternating-current measurements.

Robert S Leather, founder and chairman of the board of the Lea Manufacturing Co, Waterbury, Conn, died suddenly Jan 18. Mr Leather was responsible for developing industry's first greaseless composition for finishing metal surfaces, and from this evolved several new methods, among them, the Lea-Satin finish.

Frank Craig Nicholson, 66, chairman of the board of the W H Nicholson & Co, Wilkes-Barre, Pa, and retired chief electrical engineer of the Glen Alden Coal Co, died Jan 16.

New Shop Equipment





DoAll Band Machines Use New HSS Band

DoAll reports that its development of a new line of semi-automatic band machines using the Demon HSS saw band expands the potentialities of the use of the band machine for such operations as slotting, slitting, shaping, and notching on extremely tough metals and materials. Machines were expressly designed to incorporate features which will extract the maximum possible benefit from the band.

DoAll states that chief deterrents to production of HSS saw bands in the past were the unavailability of HSS in strip form, problems associated with heat-treating to meet the flexure requirements of a blade, and joining the band with a satisfactory weld. Recent technological advances made by steel fabricators, together with the heat-treatment and welding technique developed by the DoAll laboratory after years of research, have resulted in the present advance.

THE BLADE

The blade is offered in two tooth styles: "Demon Precision" and "Demon Buttress." The first is offered in three varieties of pitch, and five different widths from ¼ through 1 in. The buttress type is available in three different pitches and three widths from ½ through 1 in. DoAll states that the red-heat hardness of the new blade permits two to three times greater band tool velocity than that possible with high-carbon-steel blades; its greater tensile strength allows heavier work feeds and chip loads. The spring-like hardness of the back of the band is said to afford greater resistance to wear from the saw guide backup bearing, less scoring on the sides of the band and ability to absorb greater feed pressures because of greater beam strength.

THE MACHINE

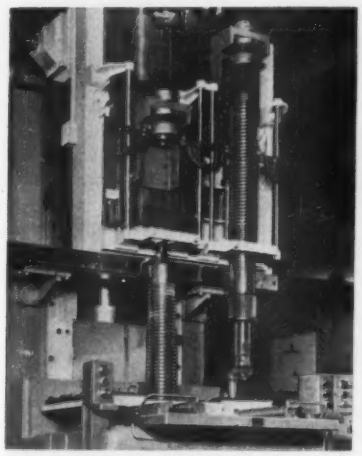
The DoAll band machine, designed to use the new blade, provides increased horsepower to assure continuous production under heavier cutting loads, ruggedness and rigidity for the reduction of vibration when making extra heavy cuts, and push-button machine operation handled from a centralized control panel, the last made possible by sensitive hydraulic power feeds and other hydraulic controls. Feed rates and pressures are adjustable to the values suited for the material being machined. Saw guidepost adjustment, automatic tool tensioning, and table position for angular cuts are hydraulically actuated and adjusted from the control panel. Hydraulic power is also used to automatically apply the brakes. As travel of the cutting tool is constantly down toward the worktable, this greatly simplifies the problem of workholding fixtures, and in many cases none are needed. Additional features include: built-in coolant facilities adjusted with fingertip control; wide, infinitely variable speed ranges (40 to 10,000 fpm); versatility allowing the performance of such operations as filing, slicing, grinding, polishing and carbide-tool finishing.

The machine incorporates a job selector which allows the operator to dial the material to be machined; selector gives proper band machining constants such as type of tool velocity, feed pressure and cutting rates. Flip latches and quick disconnect screws permit ready access to machine components for installing band tools. The operating controls are grouped together in front of the machine and are easily reached from the operator's position.

THE FUTURE

It is the contention of DoAll that because of the advent of the Demon HSS saw band (accelerating cutting rates 3 to 10 times and extending tool life 5 to 30 times), many pro-

Materials and Parts



Broach Handling Eliminated In Two Pass Broaching

Increased production and reduced handling are the benefits of a broach handling arrangement developed by Colonial Broach. This setup on a Colonial 50-ton, 62-in.-stroke, pull-down broaching machine enables large components requiring two passes to be broached internally from start to finish with minimum handling. It can be used for internal broaching of involute splines, straight splines, squares, rectangles and irregular shapes.

Colonial states that normally such parts are put through a roughing and semi-finishing pass, stacked near the machine, and then finish-broached after the broaches are changed. This means handling the parts four times.

Installation of Colonial's dual slide broach handling support means that the broach is placed in position on an hydraulically actuated receding table and requires no further handling until completion of the automatic cycle. To start the cutting cycle the operator must depress buttons at both sides of the machine which guarantees that both hands will be clear of the machine. When the cycle is started the following sequence is automatic: receding fixture brings the part into cutting position; initial pass broach is pulled through part; fixture recedes to clear broach; broach is returned to handling puller at top of machine; dual slide broach handling support shuttles to the left carrying the second pass broach into cutting position.

The table moves into cutting position and the second or finishing pass is identical to the initial pass, including return of broach to the handling pullers. The handling support shuttles to starting position and stops automatically ready to begin another cycle, while the finished part is being unloaded. The entire system is electrically controlled and has hydraulic interlocks to insure positive positioning of all components. The circuit is also arranged for jog cycle to set up or try out the machine. Handling pullers are equipped with limit switches requiring full engagement of broach and handling puller before the shuttling fixture controls are energized.

Colonial Broach Co, Box 37, Harper Station, Detroit 13, Mich

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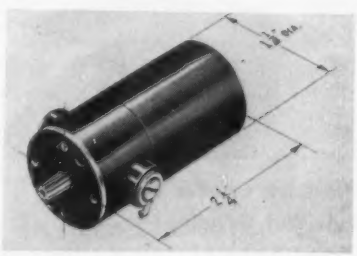
duction tasks will be transferred to the production-band machines. Operations such as slotting should show an immediate production increase. On heavy jobs where large amounts of material were removed chip by chip, the new practice should be to separate most of the unwanted material on the band machine and then make the finishing cut using the original method.

Test results show a cutting rate of 3.186 sq in. per min with a surface finish of 200 to 250 rms on SAE 4340, 4½-in. round; cutting rate of 4.65 sq in. per min on 416 stainless steel, 4-in. round.

The DoAll Co, 255 N Laurel Ave, Des Plaines, Ill



MINIATURE ELECTRIC MOTOR capable of delivering 1/30 hp at 6000 rpm may be used to operate hydraulic valves and to drive stabilizing gyros. Developed primarily for missile applications, the unit will operate continuously for a life of one hour — *John Oster Mfg Co, Racine, Wis*

... INCLUDING

Inverted vertical hydraulic presses have 5000-psi hydraulic cylinder flange-mounted to bottom side of die table ..... page 190

Production grinders designed for faster, more accurate grinding of wide range of parts ..... page 191

Deburring machine removes burrs from both sides of holes at rate of 600 to 3000 per hour page 192

Eccentricity instrument eliminates need for observing maximum and minimum indicator readings and computing difference page 196

Diesinking machine incorporates high-speed vertical milling spindle coupled to tracer by pantograph arrangement ..... page 198

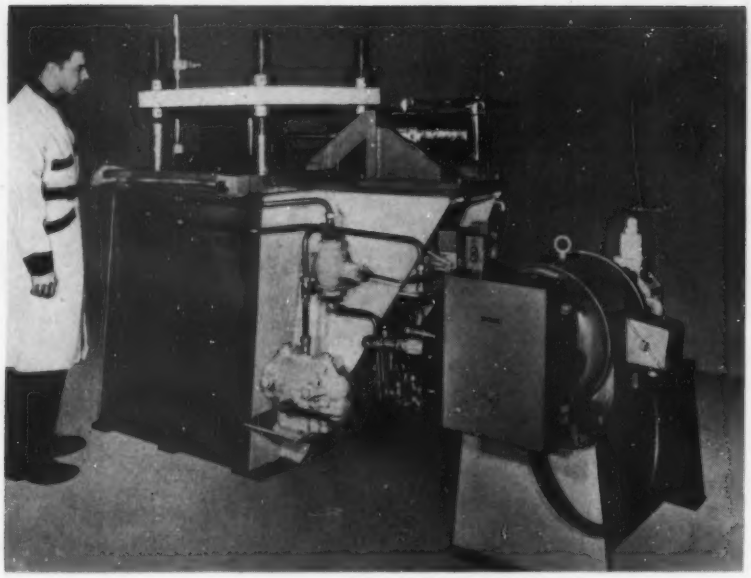
Cylindrical grinder provides automatic sizing control with full compensation for wheel wear and thermal expansion ..... page 202

Turret lathe with 10-in. swing has stepless spindle-speed control page 204

... and in Mar 1

Ultrasonic absorbtion technique for non-destructive testing of certain non-metallic solids.

Keyseater, capacity 1/16 to 1 in., features automatic centering and automatic relief.



Hill Inverted Hydraulic Presses For Stamping and Extrusion Operations

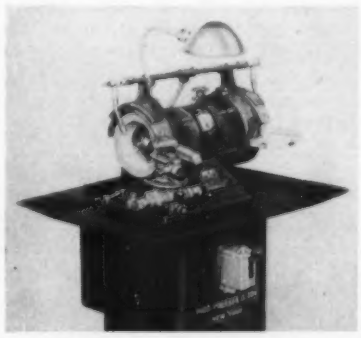
Line of inverted vertical hydraulic presses is adaptable to a wide variety of stamping and extrusion operations. The presses have their control cylinder in the base of the machine. They are said to be ideally adapted to bending and extrusion operations on ferrous and non-ferrous parts, as well as upsetting, drawing and coining operations.

Die capacity of the presses can be increased by long guide rods. Large press bed areas avoid the necessity of installing auxiliary die guide equipment. The construction features a hydraulic cylinder operating at 5,000 psi pressure, flange-mounted on the bottom side of the die table, with its piston rod in a vertical position extending downward through the base of the press. The cylinder imparts vertical motion to the upper die platen through four widely spaced rods guided in individual bronze bushings. Vertical die travel is limited only by the stroke of the cylinder. Variable shut height adjustments are made by turning spanner nuts on the threaded ends of the four guide rods.

Individual straight pieces of metal tubing are placed in the lower die and dual pushbutton cycle controls are actuated by the operator. Press then goes through an automatic operating cycle—the dies close, the auxiliary cylinder extrudes the tube to the desired form, and the dies open.

The illustrated press has a die area of 20x24 in.; die travel is 6 in.; maximum open height, 27 in. The main hydraulic cylinder is rated at 100 tons; auxiliary cylinder at 75 tons. Hydraulic pressure is supplied by a separate Hill hydraulic power pack. 5,000-psi pressure is provided by boosters located close to the cylinder. All electrical and hydraulic controls are standard types.

Walter P Hill, Inc, 22183 Telegraph Rd, Detroit 19, Mich



Precision Grinder for Full Wet Grinding

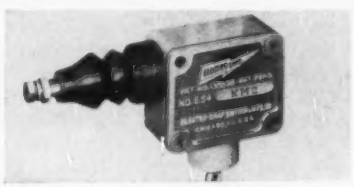
Thomas Prosser & Son has announced its precision grinder Model APW developed for full wet grinding. This model embodies all the features of the Model AP bench and floor-type machines and in addition is equipped with separate motor driven coolant pump, pan, settling tank, piping, valves, adjustable nozzles, and flexible neoprene spray guards.

Prosser reports that the machine will produce a mirror finish and keen, durable straight-cutting edges perfectly ground to exact angles on all single point tools, high speed steel, cast alloys, or carbides. All front, side, and top angles can be set precisely in both vertical and horizontal planes by means of protractors calibrated in single degrees with a vernier reading to ¼°. As tool is rocked back and forth across wheel face, feed of tool toward grinding wheel is controlled by micrometer feed knob graduated in thousandths of an inch.

The reciprocating action toolholder permits rocking the tool by hand back and forth across the entire face of the wheel, eliminating rigid pressure and localized over-heating. This also eliminates scoring of the wheel face, the manufacturer states, resulting in considerable savings in diamond wheel cost, increased tool life, and reduced down time.

One side of the grinder is equipped with a quick-acting indexing table, which can be set to the desired angle. Tools can be rough ground on vitrified wheel to slightly greater angle than finish angle.

Thomas Prosser & Son, 120 Wall St, NYC, NY



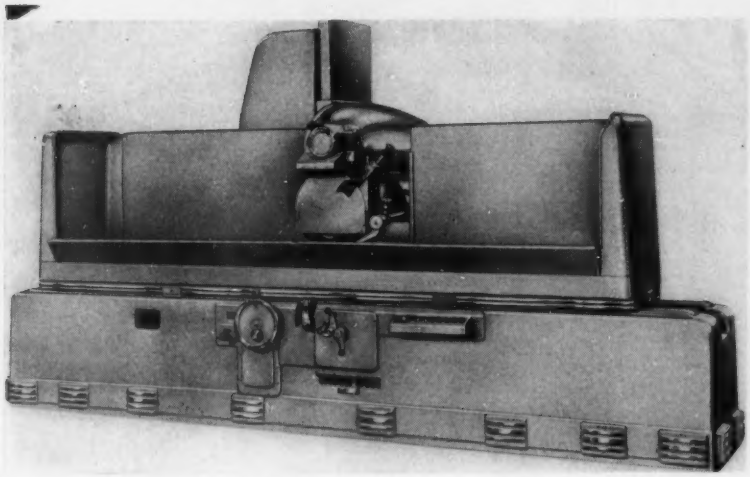
One-Way Impulse Switch

Electro-Snap ES4-KM2 snap-action switch incorporates one-way impulse action, and reportedly frequently eliminates need for time delay relays, complicated actuating dogs, and additional switches.

There is a choice of five "on" periods, from 1/16 to ⅜ in. Switch completes the circuit for a predetermined part of the plunger's forward stroke, then gives release. No further action results for the remainder of the plunger's overtravel or return stroke. High electrical capacity, long contact life, and a double-break contract provide two separate circuits with varied application advantages; tests have indicated the switch has extremely accurate repeatability.

Small, lightweight unit is a single-pole, double-throw model for ac circuits; choice of wiring includes single-pole double-throw; two circuits, normally open or normally closed.

Electro-Snap Switch & Mfg Co, 4218-30 West Lakes St, Chicago 24, Ill.



Thompson Production Grinders In a Variety of Sizes

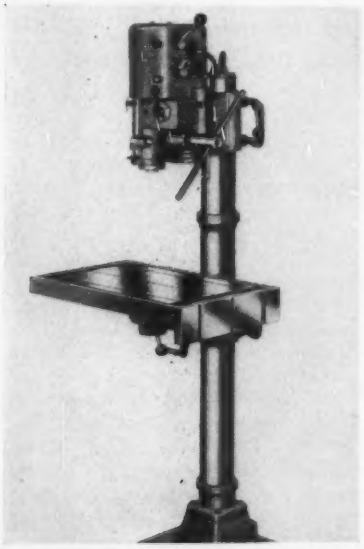
Thompson Grinder announces a complete line of new production grinders, known as the Type C, ranging in size from 12 x 48 to 24 x 168 in. The company states that these machines are designed for faster, more accurate and economic grinding of parts ranging from a tool steel broach bar to a machine tool way.

Principal features include: 20-in.-diameter wheel cross-feeding with horizontal spindle and grinding with periphery of wheel; anti-friction elevating nut; power elevation and hydraulic rapid traverse with safety stops; in-position wheel truing; complete hydraulic table speed and cross feed levers grouped in operating area and simplified with table speed variables from 10 to 100 fpm and cross feed control in increments of 1/32 in. to one half of wheel width per table reverse.

Heavy worktable support is provided and bedways are twice the length of the table. Cross slide ways are flame hardened. The motor is built into the wheelhead and mounted directly on the spindle; low pressure hydraulic system is provided with automatic lubrication and separate coolant system.

Optional equipment includes: automatic down feed; micrometer back-up stop; dust exhauster; coolant through wheel; auxiliary hand table feed; Hoglund Magniform contour dressers; Thompson coolant filter; magnetic chucks, demagnetizing switches and motor generator sets; rectifiers and neutrolators for variable holding power to chuck wheel balancing ways and arbors; magnetic coolant separators; Delpark coolant filters with automatic sludge removal; electric wheel truing.

Thompson Grinder Co, Springfield, Ohio



Geared-Head Drillpress Designed To Save Setup, Operating Time

Among the time-saving features included in a completely gear-driven drilling machine produced by the Johansson Co is provision for fast speed changes accomplished by a simple shift of gear levers while machine is running. The spindle construction, with lower bearing located at the nose, gives support where it is most necessary to assure spindle rigidity and accuracy. Quick tool changes are possible through the use of patented built-in drill ejector which ejects the drill automatically while spindle is rotating. Neither drift nor hammer is required.

For precision depth drilling and counterboring, machine is equipped with two stops. This arrangement provides one stop on the left side of the head for adjustment to the correct depth, plus a positive stop on the right side to insure maintenance of the original setting. The entire head can be swiveled 360° and securely locked in any position. This feature speeds and simplifies hole location for the operator. The head can also be raised or lowered through 5¾ in. by turning a crank.

The machined and ground column is a casting with heavy walls and extra internal ribbing. To locate a variety of work in a faster manner, the 15 x 24-in. table has three standard ½-in. T-slots on the top and one side surface. The top surface is precision ground and all four sides are accurately machined. For additional speed in locating work, this table can be rotated on its own axis, and the entire assembly and its support arm can be rotated around the column. By turning a crank on the left side of the machine, the table can be easily raised or lowered, and one turn of a handle securely locks the entire unit. A trough and outlet for coolant return is also provided.

Eight spindle speeds from 125 to 1540 rpm. are provided through the selective gear box from the 1-hp. motor. The No. 3 Morse taper spindle has a travel of 4½ in. and drills to a center of 18-in. circle. The drilling capacity is 1 in. in steel; max distance, spindle to table, is 34 in.; spindle to base, 49 in. Machine is Model 8-18.

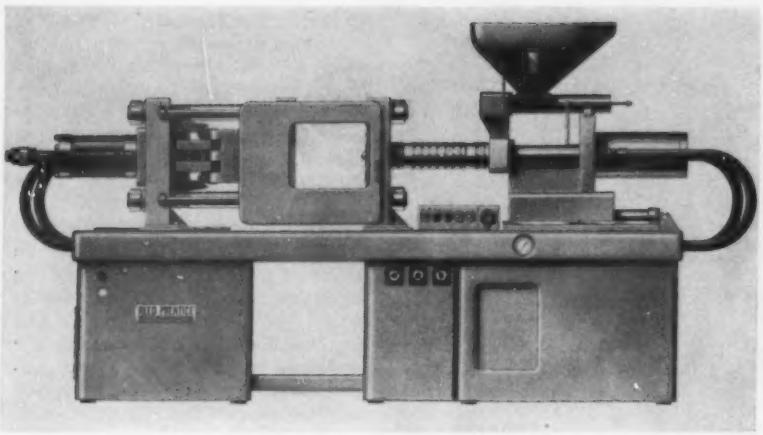
The I O Johansson Co, 7730 Austin Ave, Skokie, Ill

Durable Hand Valve Needs Minimum Maintenance

Hand valve's one-piece rotor is Hy-Car bonded. Compound contains an additive, said to provide the maximum in lubricating qualities, ease of operation, and long life. Sealing material does not pass directly over port openings.

Unit is reportedly practically maintenance free; it has passed the ¾ million mark without service.

Mechanical Air Controls, Inc, 10030 Capital, Oak Park, Detroit 37, Mich



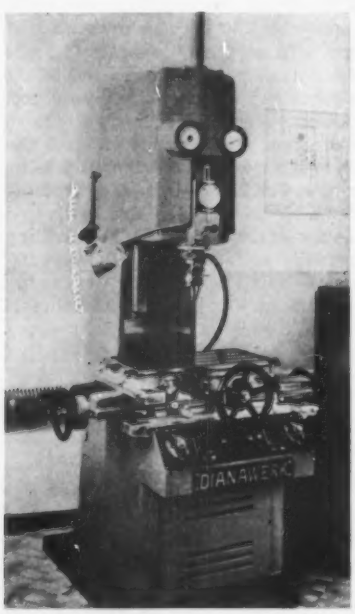
Injection Molding Machine Has 6-Second Cycle Time

The Reed-Prentice 175T-4/6 oz injection molding machine, designed for fast, continuous molding of small thermoplastic items, develops 175 tons mold clamping pressure through its double shear link mechanism. Mold stroke is adjustable from 5 to 8 in. Machine cycle time of 6 sec permits up to 600 shots per hour.

Four tie bars of 3 in. diameter support the die plates which measure 22 x 24 in. and will accommodate molds up to 24¼ x 13 in. Rated projected casting area in mold is 75 sq in.

Stuffing arrangement furnished as standard equipment permits shots of 6 oz or more through multiple strokes. Plasticizing capacity is 75 lb of material per hour on new heating cylinder with ceramic heating elements. The machine has safety doors at front and rear, hydraulically and electrically interlocked.

Reed-Prentice Corp, Worcester 4, Mass



Jig Borer Features Central Panel Board

The Diana jig borer has a maximum boring capacity of 10¼ in.; maximum diameter drilled in solid steel is 1 in. The distance from the center of spindle to column throat is 13 in.; range of feeds, independent of spindle speed, is 0.004 to 0.2 in. per sec. The accuracy of the machine is said to provide a tolerance of ±0.002 in. between holes.

The jig borer has an infinitely variable spindle speed control and an infinitely variable quill movement, both driven by a hydraulic system. Low spindle speed ranges from 60 to 380 rpm and high ranges from 360 to 2200 rpm; speeds are read on a tachometer. All controls are located on a central panel board in front of the machine.

The spindle is made of special hardened tool steel and is equipped with three special roller bearings. Spindle has No. 3 Morse Taper.

Additional features include: electric controls and hydraulic system in separate cabinet; special cooling system for main motor built into base; machine constructed of special 220 Brinell hardened cast-iron; covered V-guides on table; large diameter of indexing drums reportedly allowing location of any point with accuracy of ± 0.0002 in.; all rotating parts dynamically balanced; special center locating device; rotary table made of hard forged steel completely machined; spindle made of hardened tool steel with three special roller bearings.

Table working surface is 20⅜ x 11⅜ in.; longitudinal table travel is 15¾ in.; traverse table travel is 11 13/16 in.

Accessories include center locating device, automatic center marking unit, precision drill chuck, dial gages, complete set of clamping tools, 14-in.-dia rotary table, jig grinding head, locating microscope, and others.

Imported by Manufacturers Associates, 92 Liberty St, New York 6, NY

High Production Rate for Model Deburring Machine

The Model semi-automatic deburring machine removes burrs from both sides of holes at the rate of 600 to 3000 holes per hour—opposed cutters deburr both sides of diameters, flats, tubing, and irregular parts. The machine is equipped with fine air controls for infinite cycling and speed control. Production is claimed to be 100% or higher than conventional deburring methods and operator fatigue is reportedly reduced to a minimum.

The machine is portable and uses standard countersink-type deburring tools; spindles rotate in opposite direction to give an equalized cutting action. The air pressure required to operate the machine is only 5 to 40 lb with minimum air consumption. Work holding fixtures are not necessary. Part is inserted and foot control valve pedal is depressed, machine then automatically deburring both sides of the hole.

Setup time is reportedly reduced to a minimum and machine can be changed from one piece to another in three minutes.

Model Machine Co, 4929 Hawthorne St, Philadelphia 24, Pa

They're SUPER accurate, They're SUPER finished

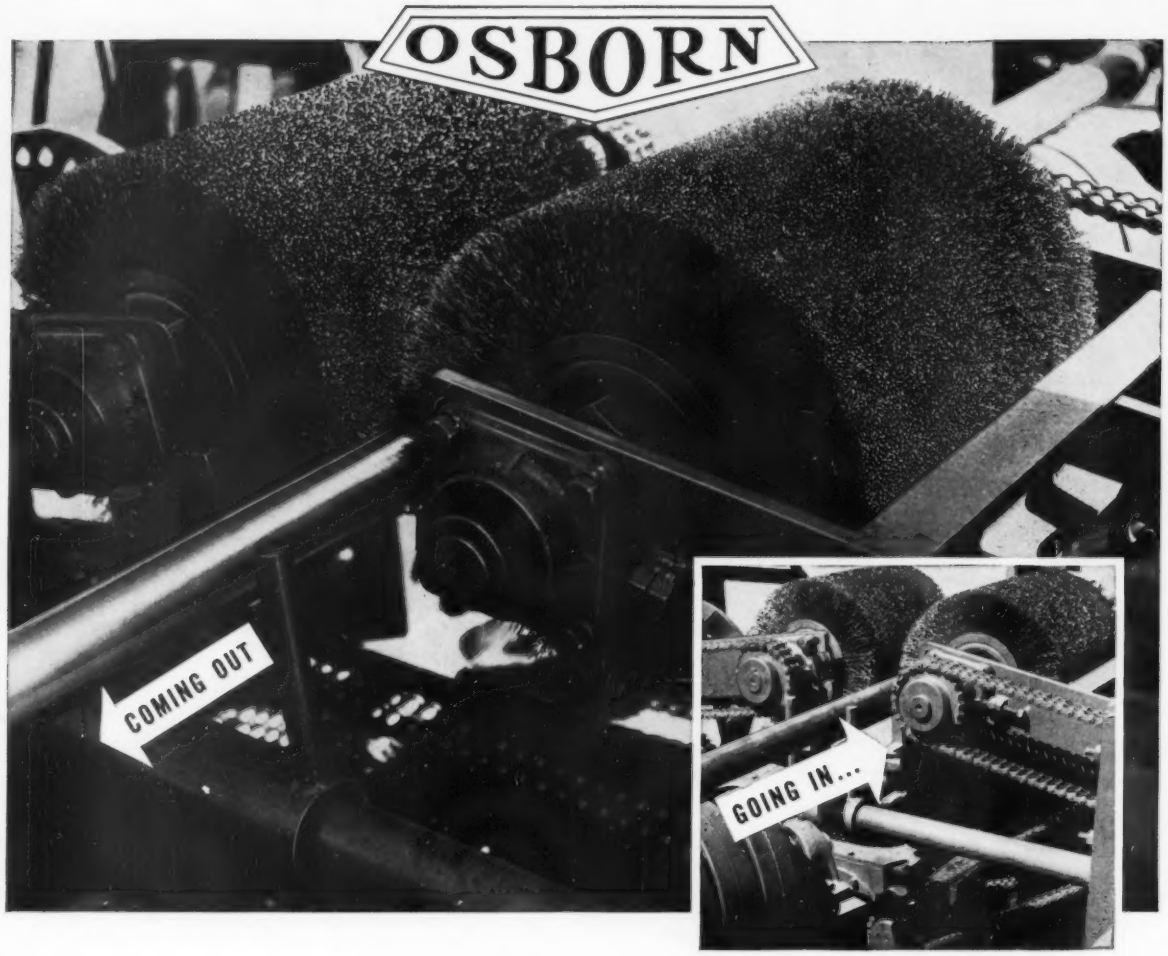
They're SUPERMETRIC

Precision ground all over — including cam lug and key way slots — SUPERMETRIC chasers match the famed precision of GEOMETRIC heads. Together they guarantee precision threading. Only GEOMETRIC offers SUPERMETRIC.

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT



Turns out a manhour saving of 90%

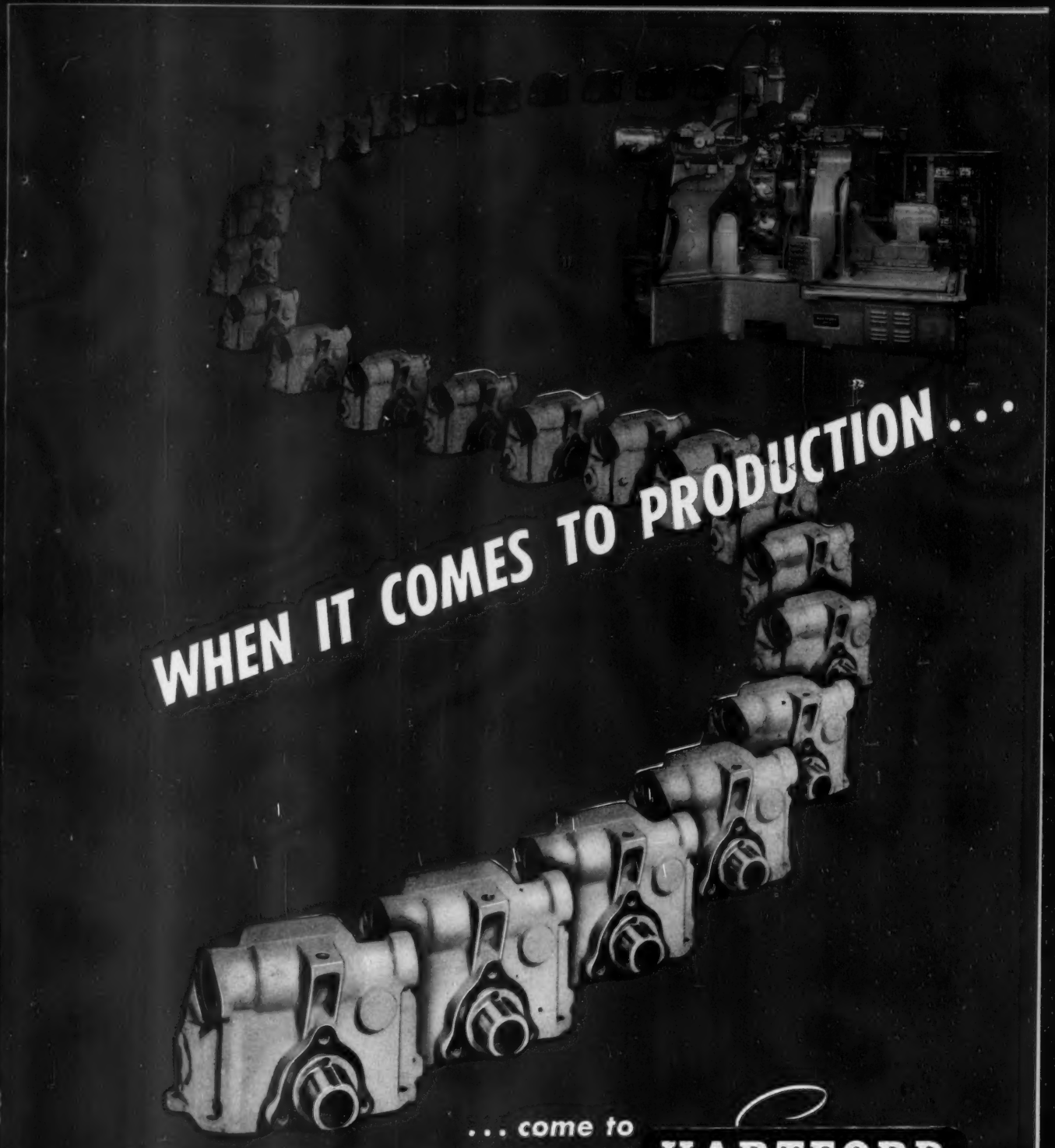
This brushing machine cleans pipe with one-tenth the manhours required for hand tool brushing . . . and does a thorough job. The pipe passes between these Osborn Master® Wheel Brushes, whirling at 1800 RPM. Loose mill-scale and corrosion disappear, leaving a perfectly clean surface for painting.

This "push button" brushing operation is typical of thousands devised with the help of the **O**sborn **B**rushing **A**nalyst. Very likely, he can help you . . . whether you process pipe or any of a multitude of other metallic or non-metallic products. Call your nearby OBA today to help cut your cleaning, finishing and deburring costs —or write *The Osborn Manufacturing Company, Dept. C-15, 5401 Hamilton Ave., Cleveland 14, O.*

FREE: New booklet on deburring with Osborn Power Brushing. Write for your copy.

Osborn Brushes

OSBORN BRUSHING METHODS • POWER, MAINTENANCE AND PAINT BRUSHES • BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



WHEN IT COMES TO PRODUCTION . . .

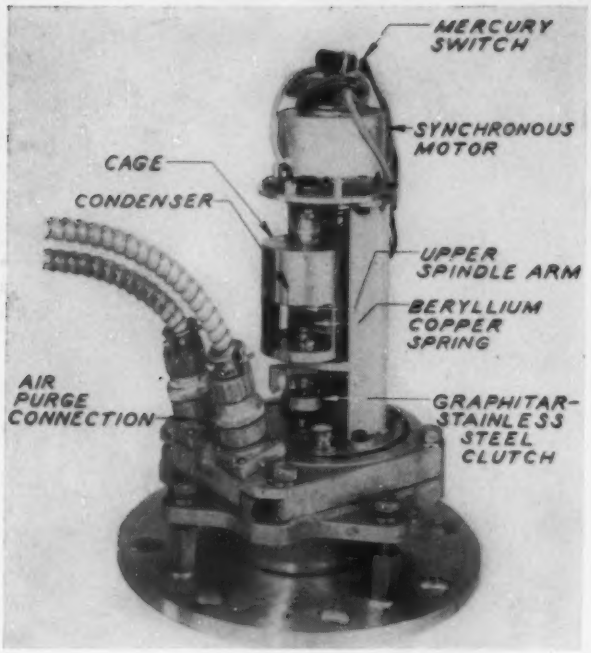
. . . come to

HARTFORD *Special*

AUTOMATIC DRILLING & TAPPING MACHINES

Hartford Special single purpose machines are custom designed and built to assure maximum production efficiency and economy. For the best buy in the long run consult Hartford Special — new bulletin available on request. Other Hartford Special production machines include Automatic Thread Rollers and Screw-Slotters, the world's finest industrial devices.

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.



Viscometran Provides Accurate, Continous Viscosity Measurement

Brookfield Engineering Labs has developed the Viscometran to provide accurate and continuous viscosity measurement of materials in process. Continuous measurement, recording, and control of viscosity, Brookfield states, can assure better product uniformity. With some products, viscosity changes may indicate the rate or degree of reaction, degree of polymerization, or process and point. In other fields, viscosity is a direct measurement of its immediate or eventual quality in service as it indicates ability to spread, penetrate, flow, or be applied.

In use, a spindle is rotated by a synchronous motor at constant speed in liquid under test. The torque required to produce this rotation is directly proportional to the centipoise viscosity of the fluid. The Viscometran transmits a signal to a suitable receiver by an electrical impulse proportional to torque.

Viscosity is measured at a constant rate of shear since the spindle of the Viscometran rotates at constant speed. The instrument may be used for applications involving base mount temperatures up to 200 F and in a vacuum from 8mm of mercury to pressures of 100 psi.

Brookfield Engineering Labs, Inc, Technical Applications, 240 Cushing St, Stoughton, Mass

Semi-Automatic Welder Adapted to Magnetic Flux

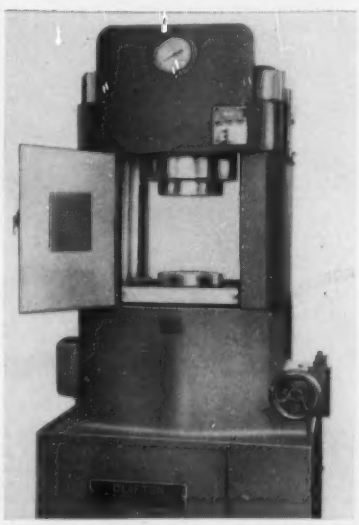
A simple, inexpensive nozzle adapter for the conventional semi-automatic or squirt welder is reported to give promise of a new and considerably wider use for this machine. The device makes possible the deposit of various alloys at speeds far higher than can be obtained by ordinary manual welding. In essence, the process utilizes the magnetic field created by the passage of the electric current through the bare electrode, plus a magnetic alloy flux which coats the wire immediately ahead of the welding arc. The operating cycle is completed by the use of permanent magnets in the nozzle adapter which acts as a dam to the flow of flux whenever the arc is broken.

As applied to build-up and hardfacing, the magnetic process reportedly provides much higher deposition rates (8 to 20 lb of deposited metal per hour using 5/64 or 3/32-in. wires). Deposits are said to be sound, with the consistency and uniformity characteristic of the automatic welding method. Time lost in changing electrodes is eliminated, and there is no stub-end loss. An important consideration is the fact that with the magnetic process the welder is using an open arc which allows him to see the actual welding at all times. While the conventional hopper is of small size, it is necessary to refill it infrequently since the ratio of deposited metal to flux used is approximately equal.

The squirt welders now in common use may all be adapted to operate with magnetic alloy flux. The adapter tip containing the permanent magnets replaces the standard tip, centers the wire to assure a concentric flux coating, and governs the amount of flux applied to the wire.

Stoody Co has developed a series of magnetic flux materials designed for both build-up and the application of hardfacing overlays. The alloys will be marketed under the trade name of Stoody Magnecote, numbered and described for identification. The first material to be released is Magnecote 301 which produces a manganese deposit of full Hadfield properties.

Stoody Co, Whittier, Calif



HYDRAULIC PRESS has 600-ton capacity and 6-in. stroke. The size of the platen is 14x17 in. The dual pumps, high- and low-pressure, are driven by a 3-hp motor. Press features "Unitrol"—a complete hydraulic circuit eliminating two-hand control by regulating both pumps. There is no piping used in the "Unitrol" circuit—*Clifton Hydraulic Press Co, Clifton, NJ*

AGAIN REVERE SAYS:

"Copper is the metal of Invention!"

Few people would consider it possible to melt titanium at a temperature of 3140°F. or above in a mold made of copper, a metal which melts at 1980°F. Yet it is being done on a production basis, and is helping in the work of making titanium metal available on a commercial basis.

The secret lies in copper's high thermal conductivity. Molds made of Revere Copper by the Central Copper Works, Inc., Cincinnati, Ohio, have a Revere Copper baffle wrapped in a spiral around them. When installed in its jacket in the plant of Rem-Cru Titanium, Inc., Midland, Pa., the copper mold is connected to a source of high-velocity water. The high heat conductivity of the copper transfers heat so rapidly to the water spiraling along its surface that the copper never comes close to its melting point.

High heat conductivity is only one of the qualities that make copper "the metal of invention." Copper is also easily workable, has the highest electrical conductivity of any commercial metal, does not rust, is easily soldered or brazed, and can be welded perfectly. The Revere Technical Advisory Service will gladly collaborate on any special problems concerning the application and fabrication of copper. Just get in touch with the nearest Revere Sales Office.

Titanium ingot, 25" in diameter, 51" long, weighing 4,050 lbs., melted at 3140° F., and the water-cooled copper mold, which would melt at 1980° F. If it were not for copper's high heat conductivity. The flange on the mold is steel, welded to the copper by the inert gas shielded arc method, using silicon copper rod.

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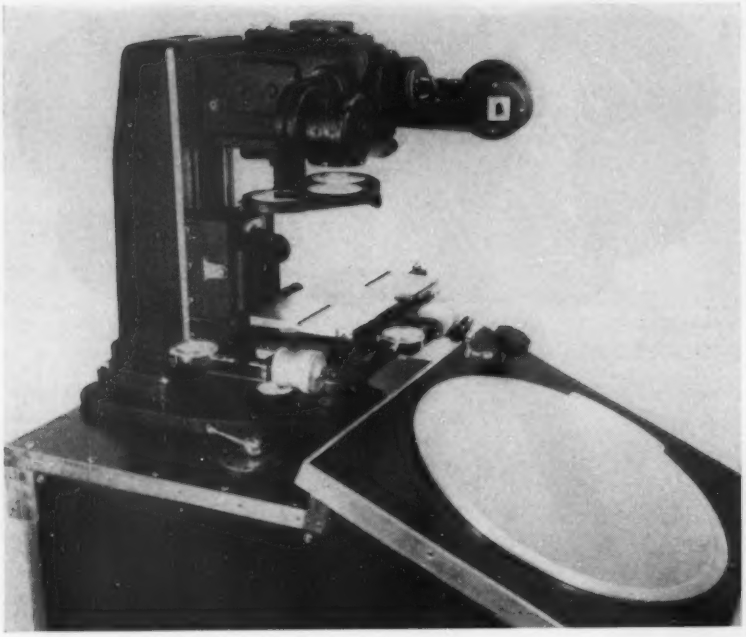


Portman Optical Comparator Features "Multi-Phase" System

The Portman "Multi-Phase" system is said to be one of the most outstanding features of the Model R-300 comparator. This optical system projects an upright, properly oriented image, reportedly with exceptional definition and screen brightness. The system also uses long focal lengths at every magnification. A new indexing lens-mounting capstan makes it possible to change from one magnification to another by simple lever control. Standard equipment includes lens providing magnification of 10, 20, 25, 31¼, 40, 50, 62½, and 100X.

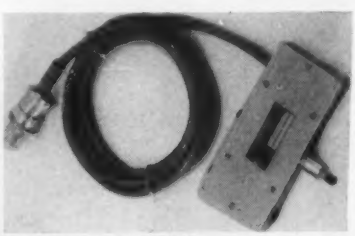
Either a plain platform-type stage, or a completely universal coordinate measuring stage may be used. Both stages are of large size, rigid, and provide for helix angle settings. The high-powered light source has a variable volume control, is blower-cooled, and provides uniform illumination over the 16-in.-dia screen area. Accessories include a spring plunger, V-type center stage, graduated rotary screen with vernier, and Dual Lens high-intensity surface illuminator attachment.

Portman Instrument Co, Inc, Town Dock Road, New Rochelle, NY

Cam Clamps

Sesco cam clamps have been designed to maintain positive holding pressure and secure clamping action on such varying stock thicknesses as are found in castings and forgings. They eliminate need for adjusting hold-down bolts or other special accessories because cam surface makes allowance automatically for stock thicknesses varying as much as ⅛ in. Clamps are said to withstand severe vibration, making them particularly suitable for many milling operations, as well as for usual applications. Available in four standard sizes.

Special Engineering Service, Inc, 8161 Livernois Ave, Detroit 4, Mich



Instrument Simplifies Eccentricity Measurements

Federal Eccentricator eliminates the need for observing maximum and minimum indicator readings and computing the difference when measuring workpieces for eccentricity. The unit can also be used in special applications for checking runout, squareness, straightness, and wobble, while ignoring normal variations in size of different workpieces. It is adjustable over a wide tolerance range of 0.0001 to 0.035 in. The tolerances are set by using any Federal dial indicator.

This instrument can be used for sorting to size with over and undersize tolerance lights, or it can be employed on high-speed, automatic, electronic gages.

The unit consists of two pivoted levers operated by movable gaging spindle, an adjustable tolerance-spread screw, and a pair of electrical contacts in one case. Movement of the spindle raises one lever which in turn raises the second lever to a position of maximum workpiece size, including run-out. The first lever retains its original setting, and the second lever is free to move within the preset distance between an adjustable limit screw and an electrical contact. When runout exceeds preset tolerance, the second lever will touch the contact of the first and the work piece will be rejected.

Any number of Eccentricators can be mounted side by side either horizontally or vertically for multiple dimension gaging at close quarters. The instrument is ½ in. thick, 3⅞ in. wide, and 1¾ in. high.

Federal Products Corp, 1144 Eddy St, Providence 1, R I

Compact Pump-Motor Unit

Eco has developed a close-coupled pump motor unit requiring no outboard support and no special alignment. Pump mount which fits the new General Electric fractional hp motors, and bolts directly to the motor housing saves space and expense.

Pump is a standard, positive-displacement unit with two opposed, axially-oscillating impellers equivalent to duplex piston action, providing continuous, non-surge flow. Unit has pressures to 150 psi; various capacities up to 10 gpm. Additional features: high suction lift; self-priming; non-foaming; no air entrainment. Impellers furnished: synthetic rubber, plastics, Teflon, Hypalon, Monel, and porous metals.

Eco Engineering Co, 12 New York Ave, Newark, NJ

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ENGINEERING EXCELLENCE

that does the Never-Before

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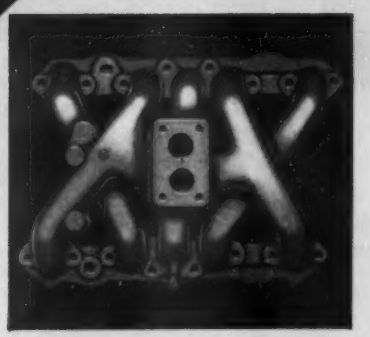
like this short Transfer with Overhead Return Conveyor— created to do a tough job in minimum floor area!



Part and Production: Intake Manifold for a new leading V-8 Engine. 180 pieces per hour at 100% efficiency.

Type of Specialized Production Equipment: 6-Station Automatic In-Line Transfer-Type Drilling-and-Tapping Machine with Automatic Overhead Pallet Return.

Tooling: Single-Place Pallet-Type Fixture with Manual Clamping. Anti-friction Drill and Individual Lead-Screw Tapping Heads.

BEFORE this PEERLESS, Plant Engineers were told that it was impossible to make a Transfer Machine which could be installed in such a small floor area.

NOW this PEERLESS, with specially-designed Overhead Pallet-Return Mechanism, is doing the job—setting a new high in maximum use of floor space!

Built to process all angular and bastard holes on Intake Manifolds, this PEERLESS was engineered for great flexibility—

Flexibility to take care of engineering changes if motor parts are altered.

Isn't this the kind of Engineering Excellence you want for your Specialized Production Equipment?

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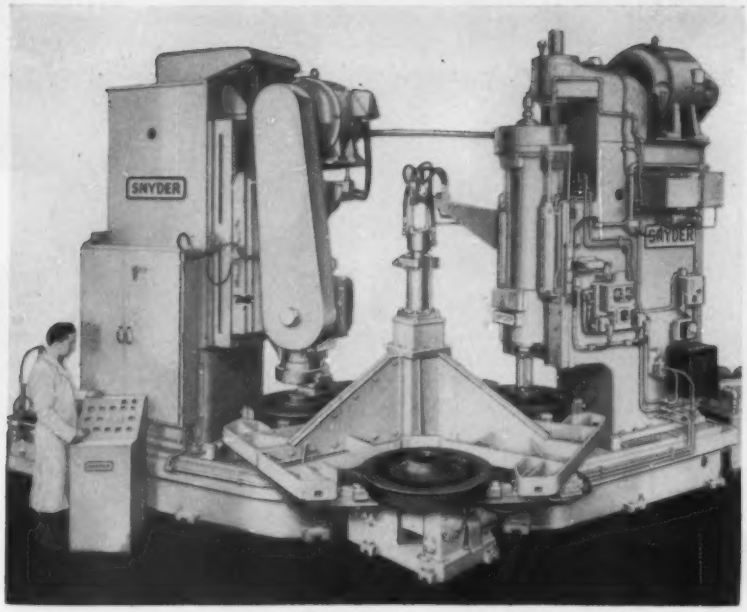


Snyder Special Machine Does Boring and Facing Job

Automatic vertical index boring and facing machine handles hubs on railroad car wheels. The machine has three major components: a vertical spindle column for facing operation; a boring head; an indexing turntable with three workholding positions, 120° part. During the facing operation, a hydraulic drawbar operates the crossfeed on the vertical spindle through rack and pinion arrangement. Four carbide tips, two round for roughing and two square for finishing, are used on the boring bar.

The indexing mechanism rotates three times during the machining cycle. Wheels are loaded into and unloaded from the front position with a two-tong hoist. Wheel blanks rest on locating seats. The first 120° rotation brings the part into facing position. The indexing mechanism lowers the wheel into the chuck and jaws clamp part in place. The second rotation carries the part to the boring position and clamps it in place.

The machine is controlled through a remote panel, the automatic set-up including indexing, clamping, cutting, unclamping, and transfer. Each operation can be separately controlled.

Surface speed is 260 sfm; feed, 0.045 ipr. The machine cycle time for boring and facing wheels with 6¾-in. bore, 7 in. long, is one minute, twenty-five seconds.

Snyder Tool and Engineering Co, 3400 E Lafayette, Detroit 7, Mich

Three Dimensional Pantograph Milling and Diesinking Machine

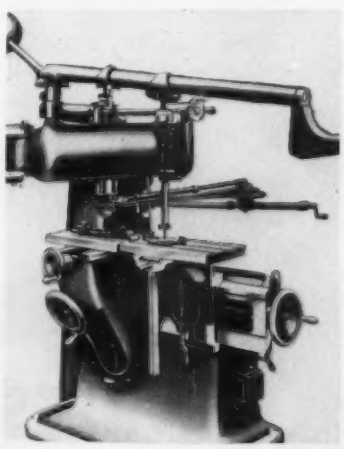
Taylor, Taylor & Hobson, Ltd, Model 3-DS incorporates a high-speed vertical milling spindle coupled to a tracer by a patented pantograph arrangement. Motion of cutter follows accurately that of tracer, both horizontally and vertically. Any type of impression can be cut directly from the solid in steel once a master has been provided.

Pantograph members are mounted on heavy-type ball bearings and the reduction is variable from 1½:1 down to 7:1. Spindle and tracer are mounted on Pantograph members and may be interchanged in position to enlarge instead of reduce. The Pantograph is provided with a ratchet-operated feed to permit systematic traversing over the work. This feed can be disconnected to allow full flexibility if it is required to follow the detail of an intricate design.

The spindle runs in heavy ball bearings and is provided with a ground internal taper in the nose to take a series of three collets for holding parallel shank cutters. Graduated micrometer dial controls depth of cut. The vertical motion can also be controlled by means of a counterweighted beam extended across the spindle and tracer.

Spindle speeds, 7, range from 800 to 8000 rpm; horizontal motion of worktable is 12 x 8 in., vertical motion, 9 in. Vertical motion of tracer is 6 in. and vertical motion of cutter is 2 in. copying, plus 1½ in. feed. Motor is ½ hp.

Imported by British Industries Corp, International Machinery Div, 164 Duane St, New York 13, NY



Pantograph which couples tracer to high-speed vertical milling spindle is provided with ratchet-operated feed to permit systematic traversing of work

Gage Dial Calculator

Derk's gage dial is a pocketsize calculator with 13 tables for quick, accurate provision of sizes of lettered drills in decimals, division of circles giving chords and including angles of division. Dial idicates sizes of numbered drills; distances across flats and corners of squares; distances across flats and corners of hexagons; taper-pins and reamer sizes; double depths of US Threads. Included are machine screw tables; NF and NC thread tables, giving threads per in., size of tap drill, size of body drill; OD of screw. Four disks give decimal equivalents, pipe tap sizes, tapers and angles and Woodruff key size. All tables are on one dial, on two sides, arranged for understanding at a glance.

Dial is 5 in. dia; ⅛ in. thick, made of pressboard.

Goodmark, Inc, 21 E 2nd St, Dayton 1, Ohio

MAJOR AUTOMOBILE MANUFACTURER DRILLS FOR OIL . . .

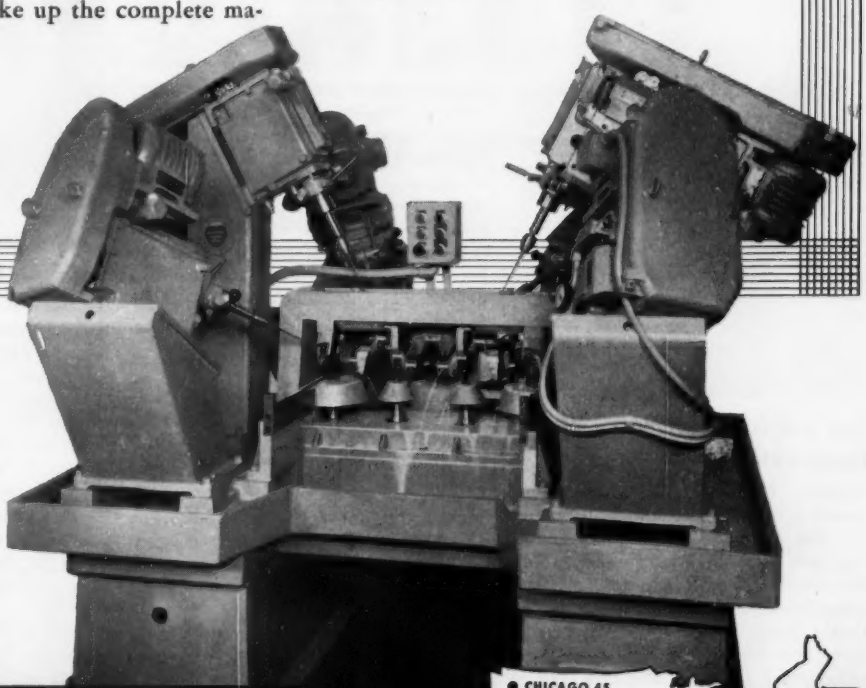
with 32 LELAND-GIFFORD Crankshaft Drilling Machines

This Leland-Gifford Drilling Machine practically takes a crankshaft out of the operator's hands, drills six perfect oil holes in it, and then hands it back.

Actually, the operator slides the crankshaft in on rails. The Leland-Gifford Machine then positions and clamps it, turns on the coolant, drills the ¼" x 5½" holes, then unclamps.

Six standard self-contained deep hole drilling units make up the complete machine. Each unit has its own feed rate, overload protection (will back out if the drill gets dull) and source of pressure. Individual units may be removed and replaced with no pipes to disconnect.

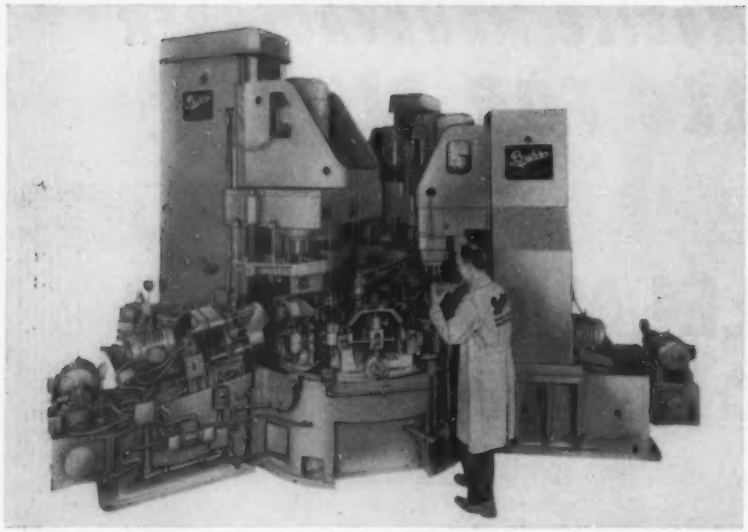
No better endorsement of Leland-Gifford Crankshaft Drilling Machines could be made than to report that the same manufacturer has just ordered additional units.



Leland-Gifford offers a complete line of modern motor spindle drilling machines plus unsurpassed engineering skill and facilities for adapting standard machines to meet special drilling needs. A Leland-Gifford field engineer can show you how to improve production and lower costs with Leland-Gifford methods.

LELAND-GIFFORD
Drilling Machines

WORCESTER 1, MASSACHUSETTS, U. S. A.



FLYWHEEL HOUSINGS are processed on this Buhr Special which is capable of handling two different models by exchanging tools. The machine is a five-way automatic six-station fixture arranged with hydraulic clamping and mounted on a 60-in.-dia automatic index table. Production rate is 100 pieces per hour and 42 operations are performed on each housing. Incorporated are hardened and ground laminated tool steel ways and ball-bearing construction for all spindles. All lubrication is automatic and electrical and hydraulic installations comply with JIC standards — *Buhr Machine Tool Co, Ann Arbor, Mich.*

Tool and Cutter Grinders Incorporate Four AC Motors

Imperia No 2 universal tool and cutter grinder (10x20 in.) is arranged for wet grinding, cylindrical grinding, and internal grinding. Four ac motors are furnished, one for the grinding wheel head, one for automatic longitudinal table reciprocal tion, one for work rotation during cylindrical grinding, and one for the coolant pump. The table can be swiveled 49° to either side. Longitudinal table movements are either manual or automatic through the vertical motor.

The grinding wheel head, with hardened and ground ball bearing spindle, can be swiveled 90° to either side. It is mounted on a rigid steel column which slides up and down in a guide sleeve and can be clamped in any desired position.

Two V-belts inside the column drive the main spindle from the horizontal countershaft at the lower end of the column. Four grinding wheel speeds from 2900 to 5800 rpm are obtainable. Change of speeds is accomplished by an easily accessible lever on the belt tension regulating device. The internal grinding spindle is driven by flat belt from a pulley mounted on the main grinding spindle.

Imported by Parker Machine Co, Inc, 158 Pioneer St, Brooklyn 31, NY

Pneumatic Die Cushion

Model CR self-contaned pneumatic die cushion is provided with a hardened and ground pin pressure pad, custom made to specific die and punch press requirements. Cushion may be fastened directly to bolster plate by one simple drilled and tapped hole, or passed through bolster plate hole and fastened directly to the die shoe. Supplied with combination reducing regulating valve and pressure gage which records the working pressure on die cushion cylinder at all times. Sizes available from 2- to 7-in. piston diameters.

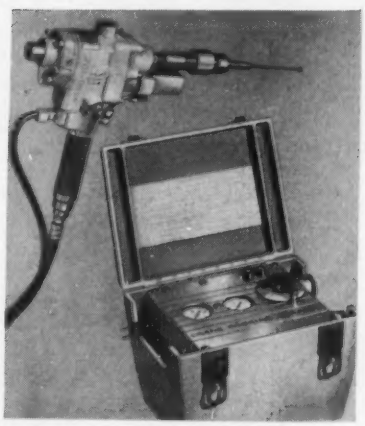
Dayton Rogers Mfg Co, Minneapolis 7, Minn

Aluminum Dispenser for Waterless Skin Cleaner

The manufacturer states that this dispenser was developed after three years of engineering experimentation, that it has an absolute minimum of parts, and that it is absolutely trouble-free. A two-way feed adjustment provides choice of amount dispensed; the spout is of no-drip type. The entire unit is constructed of heavy aluminum and a rigid mounting bracket is an integral part of the dispenser. The rust-proof exterior is polished to a smooth finish.

The special throw-away container provides from 1000 to 1500 washings. A "dip-stick" is provided for measurement of cleanser.

Sugar Beet Products Co, Saginaw, Mich



Electro-Pneumatic Operation For Tube Rolling Control

Crane Packing Co has developed a tube rolling control which combines the advantages of air operation with precision electric control. The unit is capable of rolling ferrous tubes up to 2¼-in. ID. It is adaptable for use on such equipment as condensers, heat exchangers, boilers, evaporators, and coolers.

This device is reported to insure perfectly controlled tube expansion into the sheet, so tightness and holding strength are held to the exact amount required. Leakers, cold work crystallization, and distortion or fracture of ligaments in the tube sheet are said to be prevented.

The control is designed to handle three sizes of John Crane air motors. Size No. 1 for non-ferrous tubing up to 1¼-in. ID; No. 2 for non-ferrous tubing up to 1½-in. ID, ferrous to 1¼-in. ID; No. 3 for ferrous tubing to 2¼-in. ID.

Crane Packing Co, Dept A18, 1800 Cuyler Ave, Chicago 13, Ill

TAP ANALYSIS IS HY-PRO'S SPECIALTY!

...they can save you man-hours

Hy-Pro concentrates its operation on the production of taps. Every effo.t is made toward in proving tap efficiency and cutting tap production costs. Time and time again manufacturers have saved man-hours in their operation with the help of Hy-Pro's tap experts. This repeated success has won Hy-Pro their standing in business as "the tap specialists".

It will pay you to contact your local Hy-Pro distributor today or call the company direct. They offer you a complete line of high quality taps and the experience of specialized tap production.

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HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

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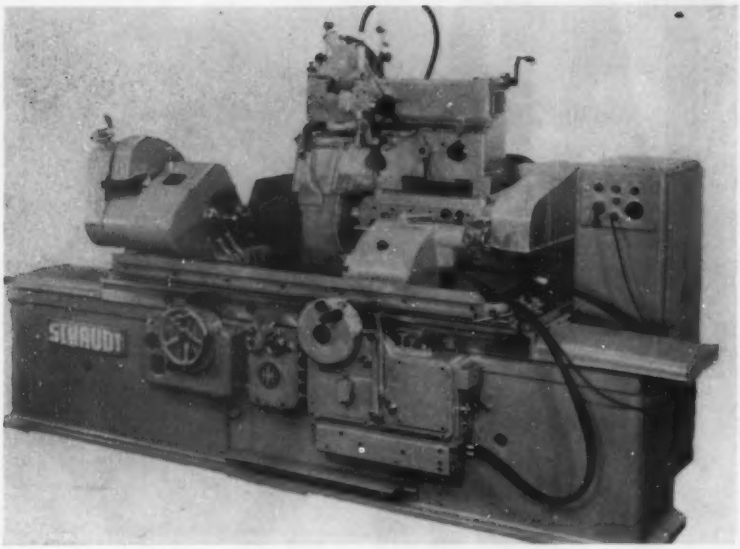


Cylindrical Grinder Provides Automatic Sizing Control

Automatic sizing control of cylindrical grinding operations to a concentricity within 0.000080 in. on long runs, with full compensation for wheel wear and thermal expansion, is said to be provided in the Schaudt MPS grinder. The automatic sizing cycle, repetitive for each workpiece, is initiated by a single main control lever. The wheelhead advances to the working position with rapid traverse and the spindle begins to rotate. If traverse grinding is to be performed, hydraulically controlled traverse of the table also starts.

The infeed, preset to 0.006 in. above finish dimension, is then engaged and the sizing head, which carries two contact jaws riding on the work diameter, is swung into position by hydraulic action.

When the first contact jaw is actuated, the machine automatically changes from coarse to fine feed, variable between 0.00008 and 0.00016 in. The second contact in the sizing head is actuated when the final dimension is reached, and the machine stops automatically at the completion of the table traverse to the left. The sizing head is then retracted and lowered to permit removal of the workpiece.

Progress of the work cycle is indicated by lights: green during coarse feed, yellow during fine feed, and red just before completion.

The sizing control is adaptable to work from 3/16 to 4 in. in dia and to either traverse or plunge-cut grinding. Four models provide max distance between centers of 20, 30, 40, and 59 in. All models have a center height of 8 in. The workhead provides 8 spindle speeds from 12 to 300 rpm; grinding wheel speed is 1100 rpm.

Machine can also be supplied with fully automatic hydraulic form dressing attachment which mounts on top of the wheelhead.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Standard Press Brakes Available From Stock

Verson Allsteel Press Co has announced two standard press brake models that are available for immediate delivery from stock. By standardizing on design and construction and by building the brakes in quantity, Verson reports that it has established prices which make it possible for small operators to use the advantage of the power press brake.

The larger brake, 25-ton capacity, will bend 78 in. of 16-gage mild steel over a ½-in die opening. Bed and ram length is 78 in.; distance between housings, 62 in. Stroke is 2 in., and speed is 40 fpm. The price of this model is $2190.

The smaller brake is the 16-48. This model is rated at 15 tons capacity and will bend 48 in. of 16-gage mild steel over ½-in. die opening. Bed and ram length is 48 in.; distance between housings, 32 in. Stroke is 2 in.; speed 20 to 50 fpm. Price of this model is $1455.

Verson will complete the standard package with standard 90°-vee dies from stock. The 78-in. set is priced at $124; the 48-in. set at $93.

Verson Allsteel Press Co, 9316 S Kenwood Ave, Chicago 19, Ill

Tennant Metal Hardness Unit Does Multiple-Angle Testing

Multiple-angle, semi-portable metal hardness tester does not use clamps —was developed for testing many parts and places inaccessible when clamps are employed.

The unit consists of a modified portable Penetrascope, movably mounted on a slotted stand, the base of which contains electromagnets to hold the unit firmly to a surface table. The unit is capable of both conventional and multiple-angle testing by: adjusting the height of the mounted Penetrascope on the slotted stand, setting the mounted Penetrascope at the required vertical angle, and setting the base of the slotted stand to the required horizontal angle.

The device employs the 136° pyramidal diamond indentor and is capable of giving accurate readings in the 16 to 800/1000 DPH range. With adjustable loads from 1 to 30 kgs, and with no restricting clamps in front, the unit is said to easily handle small, thin pieces.

C Tennant Sons & Co, 100 Park Ave, New York 17, NY

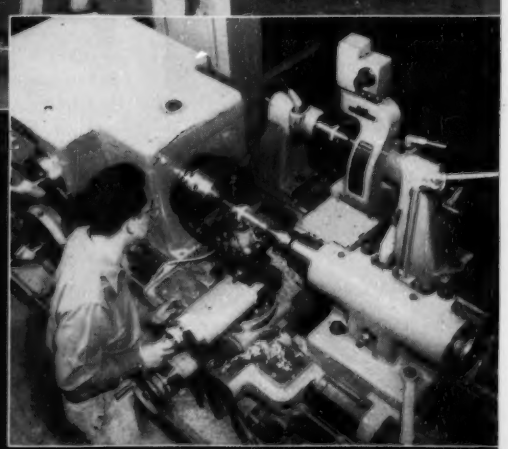
SIDNEY *can do this for you, too!*

THE SIDNEY MACHINE TOOL COMPANY
50th year
of service to
AMERICAN INDUSTRY
1906 - 1956
SIDNEY • OHIO

"EXPERIENCE WITH THE SIDNEY 20" TRACING LATHE IN DEPARTMENT B6-406 OF THE DOUGLAS EL SEGUNDO, CALIFORNIA DIVISION INDICATES A CONSIDERABLY IMPROVED PRODUCTION CAPACITY. THE TRACING LATHE WE ARE OPERATING ELIMINATES HUMAN ERROR AS FAR AS LINEAL DIMENSIONS ARE CONCERNED."

DOUGLAS AIRCRAFT CO., INC.
EL SEGUNDO, CALIFORNIA DIVISION

Photographs show Sidney Tracer Lathe making a tapered cut on airplane arresting hook tube.



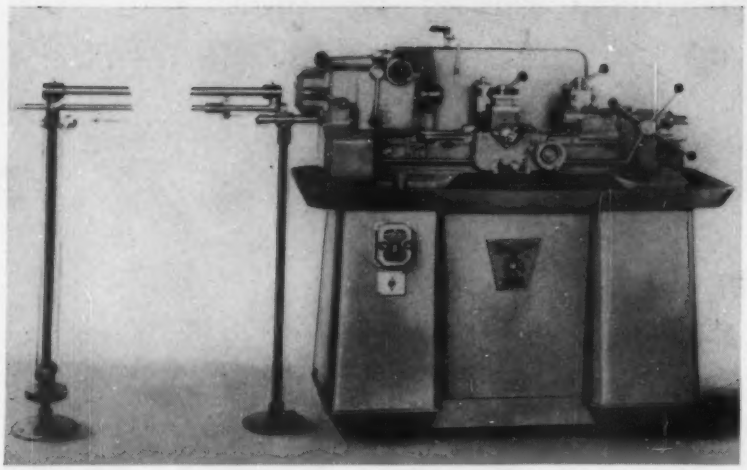
The tracer head pictured . . . the "brains" of the tracer . . . imparts all impulses to the various operating units as it follows along a template or master piece relating to these units their necessary functions in order to produce the work at hand.

One piece or a million . . . it's all the same to the Sidney Tracer Lathe . . . and all the work pieces are the same . . . every time.

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



Turret Lathe Has 10-in. Swing, Stepless Spindle-Speed Control

The ¾-in. "Little John" turret lathe has a 10-in. swing and infinitely variable spindle speeds from 290 to 1750 rpm. The spindle incorporates two Timken tapered roller bearings; collet has a ¾-in. capacity. Bed surfaces are hardened and ground.

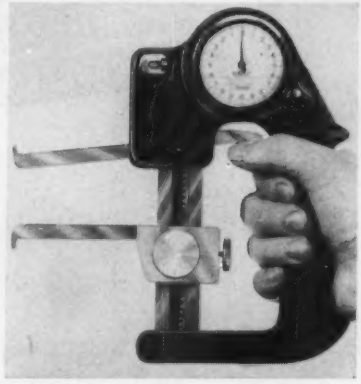
The turret slide has six automatic stops and can be supplied for manual or power feed. The cross-slide, provided with front and rear toolpost, can be either rack operated or screw operated on the saddle, which again can be provided for manual or automatic feed.

Additional features include motorized coolant pump and centrally located levers within easy reach.

Imported by Epic, Inc, 154 Nassau St, New York 38, NY

Stop gage indicator has been developed which eliminates necessity for operator of squaring shears to go to back of machine to determine exact setting of back gage. Indicator is mounted near the pushbuttons which control the power-operated back gage; operator sets its position by reading the figures shown on indicator dial. Dial is available for reading 64ths or 100ths of an inch. Circular convex magnifying lens over number wheels and dial permit unit to be easily read at considerable distance from the machine. Overall dimensions are 4¾ in. high x 4 in. wide by 2½ in. deep.

Durant Mfg Co, 1945 N Buffum St, Milwaukee 1, Wisconsin



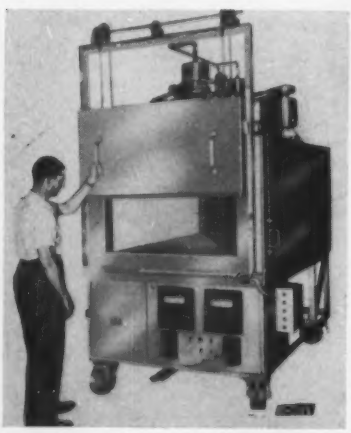
ID Gaging With "Diametrick" Wide Range Instrument

Dial indicator measuring instrument was designed for the improved checking of O-ring and snap ring grooves, but is also applicable to other inside diameters. Embodying some features of a height gage, the standard model will check holes from 1.375 to 3.625 in. in diameter and will expand to measure grooves as deep as ¼ in. Other sizes are available for smaller and larger bores.

Additional features, as stated by the manufacturer, are: inaccurate "feel" is replaced by positive indicator readings; easily set to masters, gage blocks, micrometers, and snap gages; all bearings and adjustments are outside of work; easy on indicators because it uses only the range necessary to gage within the tolerance limits.

In use, the "Diametrick" is held with the lower gaging arm resting firmly in the work, permitting rocking of upper arm in all directions. It can also be used as a caliper, and by maintenance men in checking air and hydraulic cylinders for replacement parts. The price is $295.

Mutual Engineering Service, 402 Court St, Saginaw, Mich



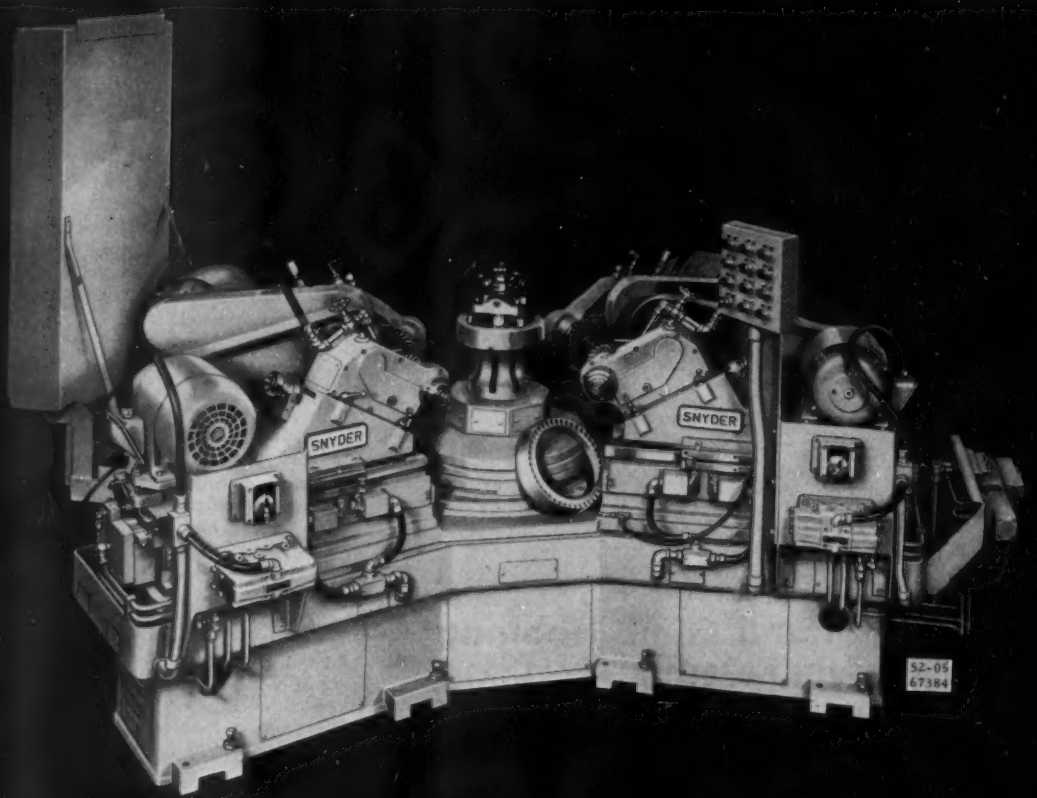
Portable Processing Furnace Is Air Circulating Type

Blue M Electric Co has manufactured a series of portable air circulating processing furnaces for experimentation, stress relieving, annealing of forgings, drawing, spinning, dimpling, stretching, and joggling of titanium sheets and castings, titanium forgings, and other alloys. The unit is said to be readily moved to the forming equipment, such as punch presses and press brakes, and materials heated to precise fabricating temperatures to 1750 F.

Temperature stratification is reportedly eliminated and uniform temperatures assured because the air is circulated by two large-diameter, low-speed multi-blade fans, water cooled. The heating elements have a 100-kw total capacity with selected wattage permissible by multi-switch design. The element banks are protected to prevent short-circuiting. Interlocks energize the heaters only after and during a certain minimum fan-shaft cooling water-flow rate has been established and maintained.

Incaloy guards prevent fan plate contacts with sheet curl-ups. Temperatures are electronically controlled with excess safety-temperature cutoff provided. Vertical-rise counterweighted door can be partially opened when inserting and removing work load and has additional safety catch handle lock on side to prevent door from releasing when work load is being inserted or removed.

Blue M Electric Co, 306 W 69th St, Chicago, Ill



NEW **SNYDER** AUTOMATIC

MILLS **8** SLOTS

IN CAST ALUMINUM ALLOY RING

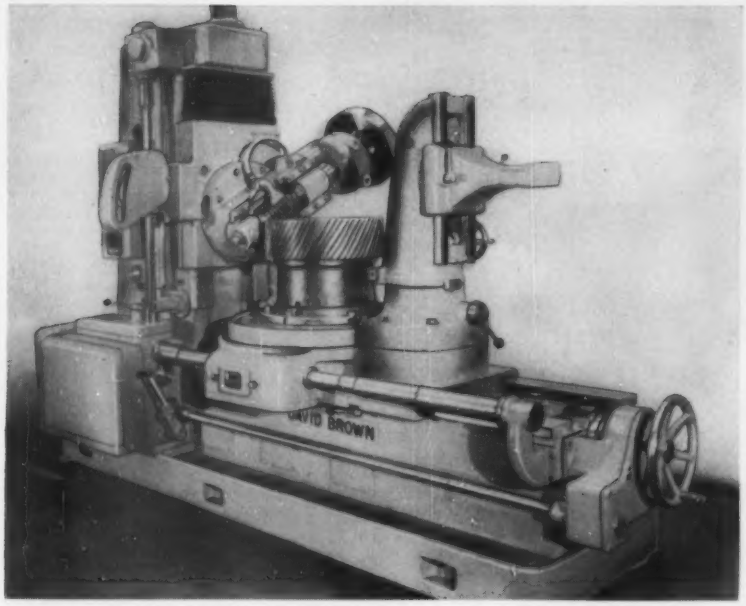
EVERY **50** SECONDS

AT **80%** EFFICIENCY

SNYDER TOOL & ENGINEERING COMPANY

3400 E. Lafayette, Detroit 7, Michigan

29 Years of Successful Cooperation with Leading American Industries



Conventional and Climb Hobbing By Moving-Table-Type Machine

Adequate equipment is available so that this David Brown MT60 machine can be installed as a universal machine for cutting spur, helical, spiral, and worm gears or spline shafts. Maximum pitch is 1½ in.; max hob diameter, 8 in.; max hob length, 10 in.; max center distance between hob and work, 36 in., minimum distance 3½ in.; diameter of table bore is 4 in. Hobbing speeds range from 21 to 107 rpm. Unit uses a No. 5 Morse Taper and a 10-hp motor.

All dividing worm wheels are cut in position with their own spindles and reported to be carefully checked for calibrations and profile accuracy. The worms are ground on a special-purpose machine, said to insure extremely close tolerances of pitch-to-pitch cumulative and cyclic error of worm threads. A dial reference is provided for checking running concentricity. Morey states further that the leadscrews are produced on a specially designed lathe with large screw of utmost precision, supplemented by special corrector bar.

Imported by Morey Machinery Co, Inc, 383 Lafayette St, New York 3, NY

Cutter Grinder Design Uses Separate Wheel Spindle Assembly

The primary function of this portable Mico machine is the grinding of all types of engraving cutters, but the device can be used to grind and sharpen special end mills, countersinks, counterbores, and lathe toolbits. Particular attention has been given to the problem of excluding grinding dust and wheel grit from the carriage slide and feed screw.

The grinding wheel spindle assembly is mounted on cast-iron pedestal attached to the base. The enclosed wheel spindle is mounted in pre-loaded ball bearings which are shielded and greased for life. This method of a separate spindle assembly for the grinding wheel is said to assure a more stable position for the end face of the wheel as well as relieving the motor bearings of an added variable load.

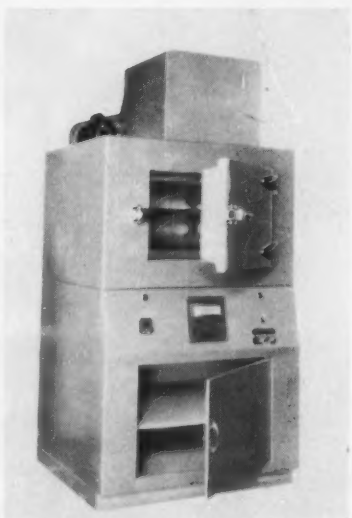
The grinding wheel spindle is belt-driven by a high-speed universal motor. Proper belt tension is obtained by means of an adjustable motor bracket.

The carriage which supports the grinding head slides on totally enclosed keys; the carriage is positioned by means of a totally enclosed micrometer screw which is controlled by the graduated drum mounted at the left of the carriage. This drum has 25 divisions, each representing 0.001 in. of feed. The tilting swivel base for the grinding head is indexed from 0 to 90 deg. A knurled thumb screw provides a lock for the grinding head.

The rotatable spindle of the grinding head accommodates conventional spring collets up to ⅜-in. capacity, as well as adapters for cutters of unusual design. A divided index wheel and thumb-operated latch provides for accurate grinding of three- or four-faced cutters.

The machine measures 10½x8½x8½ in. and weighs 21 lb. Operating speed is 7500 rpm; grinding wheel is 1½x¼x⅜ in. Price of the cutter grinder with standard equipment is $125.

Mico Instrument Co, 80 Trowbridge St, Cambridge, Mass



Re-Circulating Furnace in Variety of Sizes, Heat Ranges

Electric box re-circulating furnaces for temp up to 1250 F are available in nine sizes and two heat ranges, 0-800 and 0-1250 F. Sizes are from 18 in. wide by 12 in. high by 18 in. deep to 24x24x36.

Unit, designed with skirt cabinet, is furnished complete with Huppert infitrol, electronic indicating temperature controller, contactor, and switch box.

K H Huppert Co, 6830-32 Cottage Grove Ave, Chicago 37, Ill

RUST-PROOF
IRON AND STEEL . . . FOR YEARS!

ZRC — new protective coating — "cold galvanizes"
Costs 1½¢ per sq. ft. of 100% rust protection

Corrosion your problem? **ZRC** — new metallic zinc-rich coating — completely protects iron and steel under conditions where all other normally used coatings fail. And **ZRC** gives this greater protection at lower coverage cost — 1½¢ per sq. ft.

ZRC's Record of Results — **ZRC** painted on gas storage drums in an ocean-side location, withstood corrosive action of salt spray, weather, for 6 months, to date. Ordinary protective coatings failed within 2 months.

ZRC sprayed on steel frames used in steam curing treatment of cement block manufacture, kept frames good as new for better than 6 months. Frames normally broke down and were replaced well within this time period. Net savings — over $4,000 yearly on replacement costs, using **ZRC.**

ZRC Easy to Apply — **ZRC's** unique vehicle prevents settling of metallic zinc — makes spraying possible, requires no repeated stirring while brushing on **ZRC.** Used either way, **ZRC** forms a tough, firmly adherent coat — touch dry in 30 minutes, completely hard in 4 hours.

ZRC can be applied directly over adherent rust, mill scale, pitting — prevents further rusting, allows no sideways spread beneath the **ZRC** coat — no rust "creepage".

what is ZRC?

ZRC is a zinc-rich coating that protects iron and steel as effectively as hot dip galvanizing or electroplating. **ZRC** contains 93%-95% metallic zinc in a vehicle that prevents settling. A normal coating of **ZRC** deposits ¼ oz. metallic zinc per sq. ft. of surface. It is firmly adherent. **ZRC**'s action is electrolytic and sacrificial. The zinc becomes anodic (A & B, diagram), while the protected iron or steel becomes cathodic, (A^1 & B^1, diagram), in the presence of water vapor. Corrosion attacks at the anode — the zinc layer — forming a film which itself helps retard further corrosion. The cathodic iron or steel is untouched.

Full engineering assistance available

Bring your toughest problems to us. The Sealube staff of corrosion specialists is prepared to help you save time, labor, maintenance costs.

ZRC SAMPLE

Test **ZRC.** Sample quantity — enough to cover 8 sq. ft. — is available. Also **ZRC** information folder. Write Dept. A

CAULKING AND COATING DIVISION

The SEALUBE Company

WAKEFIELD, MASSACHUSETTS

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production

SNOW

FULL UNIVERSAL MACHINES

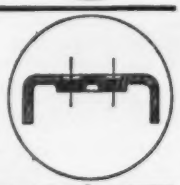
Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Crossdrill and C'"I" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

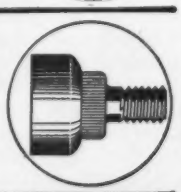
TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

Submit Sample Parts f

SNOW
MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Haynes Alloy No. 25 (L605) sheet is now being cold rolled in thicknesses down to 0.0005 in. Cobalt base alloy has high strength and hardness combined with excellent corrosion resistance at temperatures up to 1500-2000 F. Cold working results in a wide range of hardness values, as high as R_c 55.

Metals & Controls Corp, General Plate Div, Attleboro, Mass

Nu-Tex mounted points, designed for use on all types of precision instruments and machinery, have a soft, cushion-like grinding action that cleans, polishes, and deburrs all types of metals and plastics in one simple operation. Points, which will not clog or load even on softer metals, are available in all popular grit sizes. Grades range from 0 (hard) to 5 (soft).

Atlantic Abrasive Corp, South Braintree 85, Mass

Black granite plate, known as the Toolmakers Flat, has been introduced in a new small size for bench use. The 15-lb unit is 8x12x2 in.; finished to an accuracy of 0.0002 in. overall. Price $22.95.

Collins Microflat Co, 2326 East 8th St, Los Angeles 21, Calif

Adelphi counter-rust reportedly will protect a steel structure from corrosion for a period of from 5 to 10 years with a single coat. Moisture-resistant product can be applied over any film of paint in fair to good condition; minor rust spots are isolated and neutralized. One coat of the product equals three coats of commercial rust inhibitive paint in film thickness.

Adelphi Paint & Color Works, Inc, 86-00 Dumont Ave, Ozone Park 17, NY

No. 530 marking crayon, made of natural soapstone, has been introduced for use on rough steel plates and cast iron. Marks will remain sharply etched under heat generated by acetylene torches.

Joseph Dixon Crucible Co, Jersey City, NJ

Dual-control has been added on Cincinnati metalworking shapers' electro-magnetic brake and clutch; this permits more efficient handling of large, awkward work which obstructs operator's view from normal working position. Electro-magnetic clutch itself is standard equipment on Cincinnati shapers.

Cincinnati Shaper Co, Hopple, Garrard & Elam Sts, Cincinnati 25, Ohio

ROUND TABLE Discussion

MEDDLIN' MANAGERS

What's the best way to handle the executive who delights in puttering around the shop, particularly during a heavy-schedule run? Is patient attention the answer or will tactful hints do the trick?

MANY MEN WHO ARE EMPLOYED by large corporations and who are not members of the brass, do not realize the great importance which the owners and high executives place upon perfect organization and 100% efficiency.

Is it possible that Al, with all of his good intentions, has never stopped to think why Johnson is the manager of the plant, and not he. Remember that a manager's position in big business corporations may be due to the fact that no detail is too small for him, or his lieutenants to be aware of, plus the fact that there may be much room for improvements in many operations.

The fact that Johnson is the manager and may be considered as being at the top, or near it, is sufficient proof that the directors and owners of the stock recognize his ability and foresight; if he were not successful in bringing about results, he would be losing money for them and would be replaced by another man. So it is up to Al and all others to give him their fullest support.

It may be true that Johnson does not have a college degree, but neither did Henry Ford nor did Thomas Edison, and look where they were, in our world, when they kicked off.

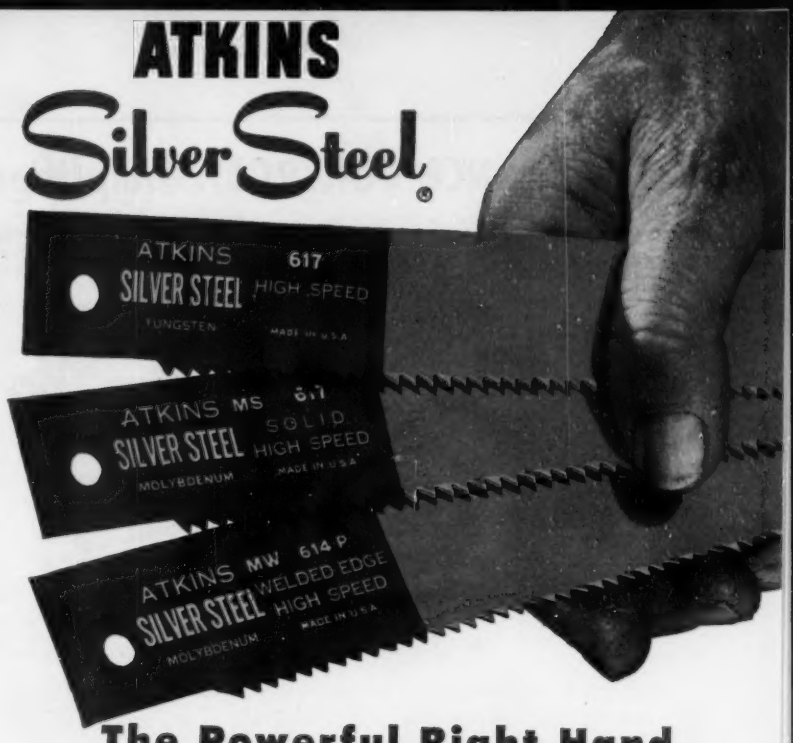
It looks as if Johnson has the natural good judgment and trained common sense to be on the watch, much more than some, for improvements in machinery operation and in the men in order to coordinate them in the best way and so make up the maximum in the production line.

There are many cases where an engineer without much ability has come up to positions on a level with Johnson's by dogging his way, and such engineers know their stuff; they also know when to quit certain personal uses of the power which is theirs.

But many men of this class have overstepped the scope of their positions by too much meddling and they have lost the respect of the management and of the men who work for them.

It is often found that the man who

ATKINS
Silver Steel®



The Powerful Right Hand for All Your Metal Cutting!

Remember . . . it's the blade that does the cutting!

BUY ATKINS AND GET:

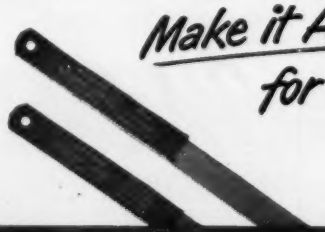
- The Right Alloy
- The Right Cutting Edge
- Consistent Low-Cost Operation
- Maximum Production
- Minimum Down Time

SILVER STEEL TUNGSTEN—the choice for the toughest jobs, for fast, efficient cutting of highly abrasive materials.

SILVER STEEL SOLID MOLYBDENUM—the economical all-round blade to cut both ferrous and non-ferrous metals.

SILVER STEEL WELDED EDGE MOLYBDENUM—it's shatterproof for top production and extra life in general purpose cutting.

Make it Atkins Silver Steel® for hand cutting too!



New improvements in Atkins metallurgy and manufacturing make these *Silver Steel* hand blades ideal for the most exact cutting. They're High-Speed Tungsten and High-Speed Molybdenum, either All-Hard or Flexible Back.

ATKINS Silver Steel SAWS

ATKINS

BW

ATKINS SAW DIVISION · BORG-WARNER CORPORATION
INDIANAPOLIS 9, INDIANA

MAINTENANCE CONTROL...*Simplified*

NEW Illustrated Bulletin on request

Step-by-step procedure providing positive control . . . . with little clerical work

- Maintenance Request and/or Maintenance Order . . . for all maintenance jobs . . . repairs, new work, inspection, etc.
- Maintenance Supervisor's Order Control . . . progress or follow-up records . . . information for management reports, etc.
- Scheduling and Job Assignment . . . assignment and instructions to Craft chiefs and foremen . . . by Craft chiefs and foremen to workers and crews.
- Job Costs, daily and final.
- Material Control.
- Tool Crib Control.

McCaskey procedure illustrated and described in this NEW folder are readily adaptable to your individual plant requirements.

MAIL COUPON FOR COMPLETE INFORMATION

McCASKEY REGISTER DIVISION
Victor Adding Machine Company
ALLIANCE, OHIO

Please send me complete facts on McCaskey Maintenance Control.

Name .....

Position .....

Company .....

Address .....

AM-2-15-54

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION - INVENTORY
TOOLS - MAINTENANCE - COSTS
THE McCASKEY REGISTER DIV.,
Victor Adding Machine Co.
ALLIANCE, OHIO
Galt, Canada Watford, England

knows the ropes is seldom a meddler but he closely observes all that goes on. He is constantly looking both to improvement in present conditions and creation of new ones so as to make up a complete and smooth-running organization.

In regard to a good foreman, one of the first principles is to obliterate the personal element, not be too critical of those in higher authority, and to be able to use any good ideas he may learn from any man, whether he be higher up or someone who may be working under his direction. It is up to Al to use the greatest amount of diplomacy which he can muster and always to remember that "a soft answer turneth away wrath."

And here let us show an example of how one manager got results in regard to a costly operation.

The corporation of 30,000 employees, was paying at the rate of $54,000 per year to have a certain operation done upon one of its products; in addition to this, was the cost of carting both ways and the handling in and out of their plant.

In a friendly discussion, the manager put it up to the plant engineer to design and assemble a machine which would do this work. The operation was a somewhat difficult one, but a small model was tried out and it looked as though a full-sized machine would do the trick, and it worked to the satisfaction of all concerned.

By doing the operation manually, it had required 7 minutes, forty-eight seconds for two men and this compared favorably with the time required to do the same in the jobber's shop. When working with the new machine, they found that the elapsed time of the two men was one minute and thirty-seven seconds.

The foreman of the department where this work was done kicked like a balky mule because the new machine was not in line with his ideas; he insisted that letting the job out was the best way.

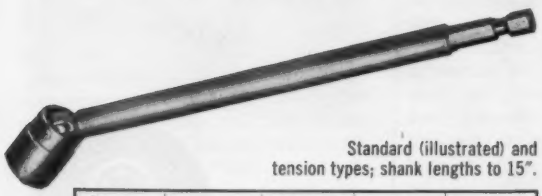
Later the manager and the plant engineer worked out a further improvement so that one man did the operation in fifty-four seconds. Under similar circumstances, Al's face would have been red.

As a few last words, the manager's position looks as if he is there to produce reduction of costs in manufacturing operations throughout the plant and make suggestions as to where money can be saved.

Al, get over your grouch and push harder than ever. No matter who meddles or tries to interfere, *push*.

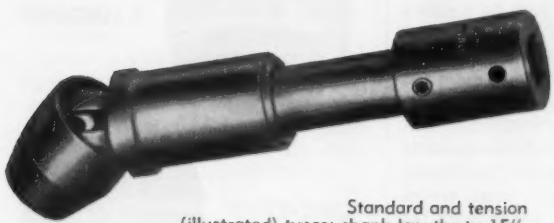
F H Stebbins
Worcester, NY

APEX offers you 3,910 choices in Impact Extension Universal Wrenches!



Standard (illustrated) and tension types; shank lengths to 15".

Hex Drives:	¼"	5/16"	3/8"	5/8"
for Hex nuts:	¼" to 5/16"	¼" to ¾"	¼" to 1 1/16"	5/16" to 1 1/4"
for Square nuts:	¼" to 3/8"		¼" to 13/16"	5/16" to 15/16"



Standard and tension (illustrated) types; shank lengths to 15".

Square Drives:	3/8"	½"	5/8"
for Hex nuts:	¼" to ¾"	¼" to 1 1/4"	5/16" to 1 1/4"
for Square nuts:	¼" to 5/8"	¼" to 13/16"	5/16" to 15/16"

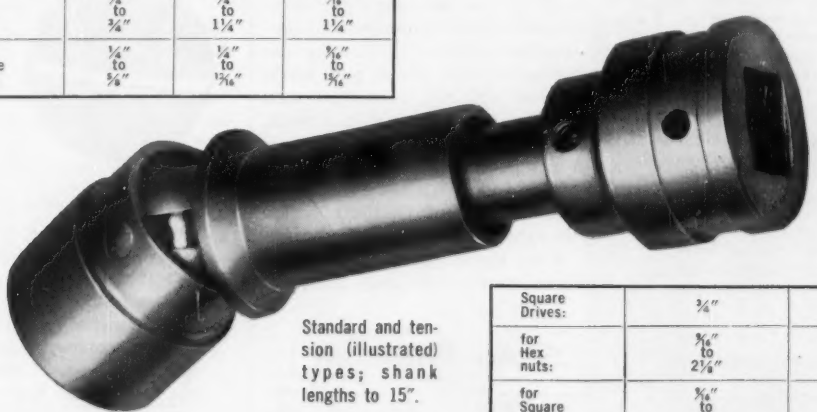
When ***your*** nut running operations call for impact extension universal wrenches, choose yours from the 3,910 types and sizes offered by Apex.

You'll increase productive output—Apex wrenches eliminate all connections, provide direct drive from tool to work, insuring greater torque. Will not bind or catch, even at 35° maximum operating angle.

You'll save production time—Tension type wrenches have sleeve-enclosed spring which holds socket firmly in straight or angular position. Ends awkward hand-positioning of sockets in those hard-to-reach spots.

You'll have less wear-out and breakage—Each Apex wrench is precision machined from high carbon electric furnace alloy steel, cold broached and heat treated to withstand severe shocks and strains.

There's an Apex impact extension universal wrench exactly fitted to ***your*** nut running job — write, on your company letterhead please, for Catalog 29, in which you'll find thousands of Apex impact sockets, extensions and adapters for every nut running operation.



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for Hex nuts:	5/16" to 2 1/16"	13/16" to 2 1/16"
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MOST FOREMEN WILL APPRECIATE the situation arising from the activity of an overly solicitous factory manager who persists in interrupting production schedules by too many unwarranted visits to the shop. Meddling managers are symptomatic of the changed status of foremen in recent years. On the basis of a number of studies carried out in the past few years, it appears that certain mangerial actions, some in the nature of downright meddling with the foreman's handling of production and personnel, have tended to weaken and disrupt the foreman's importance, worth, and proper place and duties in an organization.

Enlightened management today is seeking to rectify those unsatisfactory conditions and supply the satisfactions which foremen need to successfully carry out their duties. These are generally in the line of helping the foreman to feel that he plays a really important and necessary part in mangerial activities. The foreman, for example, is anxious to exercise some authority in the selection of his subordinates. In some concerns, however, he is required to accept any worker who is sent to him by hiring or transfer from another work group, regardless of whether he believes the new man is acceptable, technically or personally. Good foremanship status is much better maintained when the foreman has the privilege of selecting an addition to his force from several candidates sent to him by the employment department and when he is not required to accept men whom other supervisors do not want.

A meddling factory manager can mess up production schedules and the proper functioning of a foreman's department through actions which impair supervisory morale in connection with the foreman's decisions. Whether production and technical

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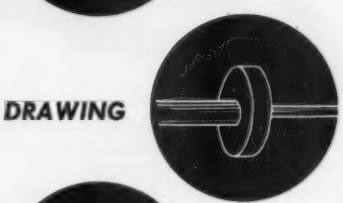

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matters, or personnel problems are involved, higher management sometimes overrules the foreman without hesitation or consideration. This is especially serious in grievance cases because it lowers the foreman's status in everyone's opinion. He wants, and is entitled to receive, the same respect from his own superiors that he is supposed to give to those below him in the company.

It would seem the better part of judgment on the part of the factory manager to consider the importance of the foreman in the successful administration of the company. Treating him with a "poor relations" attitude is not conducive to good management. The manager's place is at the head of the organization; unnecessary interference in the individual departments where the foremen are functioning under delegated authority will only lead to grief and inefficiency.

What can be done about the executive who fancies his abilities as a shop man? That's a hard nut to crack. It requires a great deal of tact on the part of the disturbed foreman when the manager's activities in the shop reach the point of interfering with production schedules. In my opinion, Al could make a few pointed suggestions in a safe direction, but he should realize that within the framework of the organizational setup he must administer and respect the policies of his supervisor. However, tactful suggestions of the foreman that the manager's ideas are always welcome, and enlightenment of the manager to the problems of the foreman in meeting production schedules, might bring relief from unnecessary meddling. The foreman will win more cooperation through diplomatically discussing the problems that are inherent to meeting his production schedules. The foreman shouldn't forget that the manager has his troubles too. He must walk a tight rope between those who glower

"He dropped a bar on it Tuesday when the noon whistle blew."

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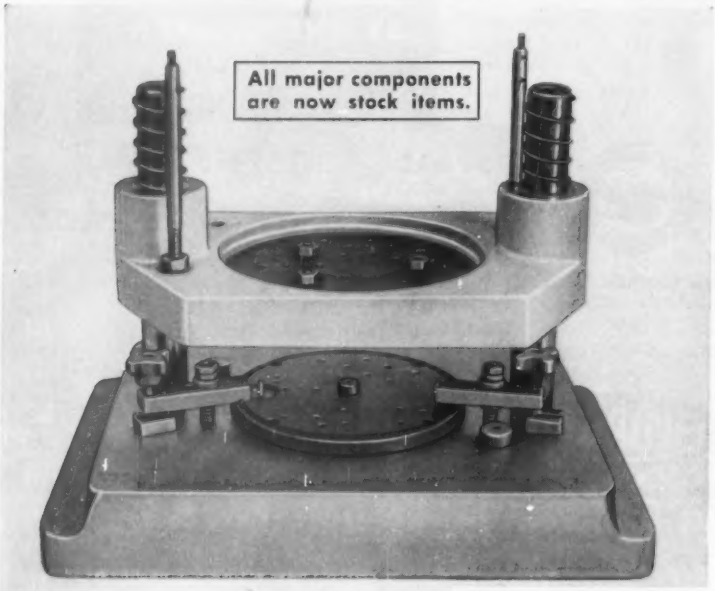

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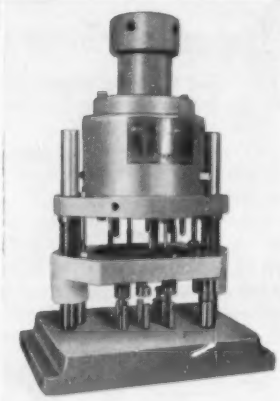

▲ *Zagar 15-spindle, 7" diameter gearless drill head mounted on Zagar standardized drill jig drills 15 holes in aircraft part.*

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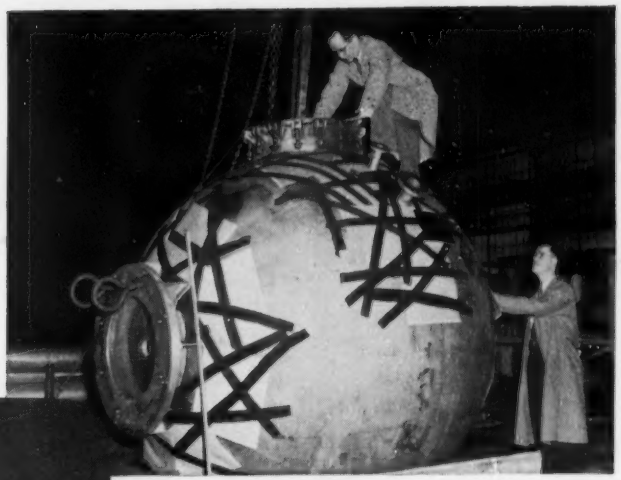
and those who apple-polish. Meddling in shop affairs may not sound so bad under another name, as for example, interest in getting away from the cares and pressure of a top executive's responsibilities.

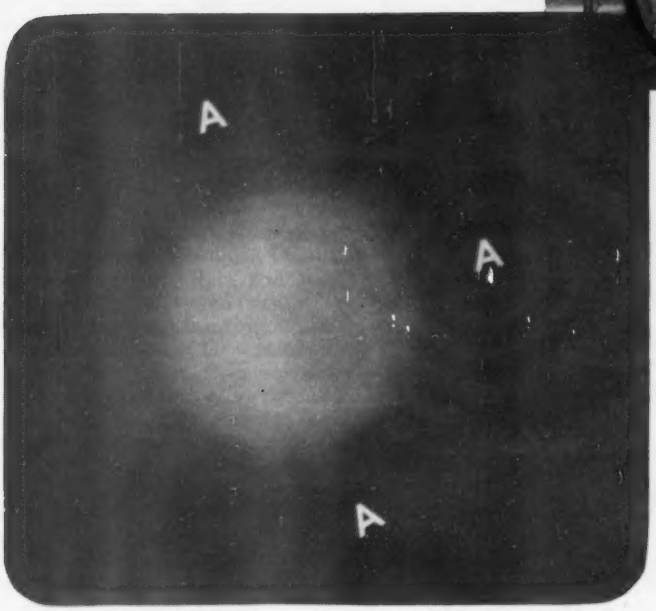
The factory manager and the foreman, meeting in monthly conference for discussion of work problems, can do much to engender proper understanding and respect for the importance of their respective positions in the organization. Foremen should realize that the manager is responsible for over-all planning for the entire plant, the meeting of work schedule dates of all the foremen, and general supervision of personnel in all departments. Foremen must follow and work within the lines of delegated authority stemming from the top. They should understand and respect the responsibilities of their factory manager.

The wise manager, on the other hand, should make certain that the foreman has the responsibility and that his authority as a foreman is not hamstrung. Having maximum responsibility for operating his particular department and meeting production schedules, and being given full authority over the activities of his men, with minimum interference from the top-side, will permit the foreman to steer a straight course between management's and workers' interests in carrying out the functions of his job. Unnecessary meddling by the top executive in the running of a shop department, under whatever pretext, negates good organizational management. The manager, under the concept of organization and management functions should operate at the level of over-all planning and delegate responsibilities and corresponding authority to his foreman who are held accountable for the successful operation of their particular departments.

Meddling managers nullify delegated authority. They hurt the fore-

"Great guns! Didn't I tell you that order for gears had been canceled?"





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man's status. Foremen are the executors of good management policies, and their success in carrying out this responsibility depends to a considerable extent on their own status as foremen. Status, in turn, depends on a great many factors, such as consultation in matters concerning the job and the employee body, and adherence by management to authority delegated to its foremen. There is often, however, a decided difference between pronouncements of concern by top management for the foremen and the ways in which the foremen are actually treated.

The foreman has often been referred to as a "forgotten man." Whether this is true or not, his functions have really changed in the past decade. Traditional responsibilities such as uncontrolled hiring and firing are no longer his, but new and more important duties have taken their place. The distinctive nature of the foreman's job, as compared with that of the rank-and-file employees he supervises, is now being given the recognition and consideration it deserves by many companies. He is being given more leadership in manpower management. He is being assigned added responsibilities involving control of quality and costs. The foreman is being expected to control quality and costs in part by his own direction and inspection and in part by creating an interest in cost reduction and efficient performance among those he supervises. He is being given training in leadership so that he can get others to do efficiently the work for which the organization is maintained.

Management can give foremen proper status as part of management by allocations of proper authority, adherence to delegation of authority, promotional programs, a voice in policy formation, participation in making the rules, and unhampered

"Good morning, Mr. Bertram! Looks like we're both late this morning."

administration of the departments they were appointed to supervise.

Perhaps there ought to be a course given for managers where standard practice of good organization relationship would be inculcated in plant managers. One salient point should be understood by all men who profess to be managers of factories, and that is that lines of authority should be observed by top management in dealing with subordinates. There should be an organization chart which outlines procedures of control and lines of authority to guide top management. The machinery or procedure for handling work as designated by the organization chart should prevent executives and those at the top of the organization structure from going over the heads of immediate subordinates to give orders or instructions, or to obtain information. The established lines of communication as indicated in an organization chart should be understood and followed. Persons who are by-passed are often humiliated and hindered in carrying out the duties of running their respective departments. Executives who do this cannot expect to hold subordinates responsible for the work of those under them. Foremen of departments should not be expected to make concessions to personalities, peculiarities, or special fancies of their supervisors.

The top executive who fancies his abilities as a shop man and desires to get his hands dirty in the shop once in a while should realize that he is not helping the efficiency of his subordinate, the foreman, by piddling his fingers in the production pie. If he has ideas for improvement of work in a particular department he certainly should consult with the foreman, not the worker. Unfortunately, some managers like to assert their authority in a negative way by going over the heads of their foremen and interfering directly with the work of the men on the machines. Foremen cannot be blamed for resenting interference or meddling in the work of their departments, and chafe at the handling they are receiving from those who should know better.

Actually, top management and foremen should complement one another in the performance of their work. Each is in reality dependent upon the other for the smooth functioning of the organization. Top management should do all it can to gain and hold the cooperation of its subordinates. The main concern of the manager should be performance of his duties according to organization

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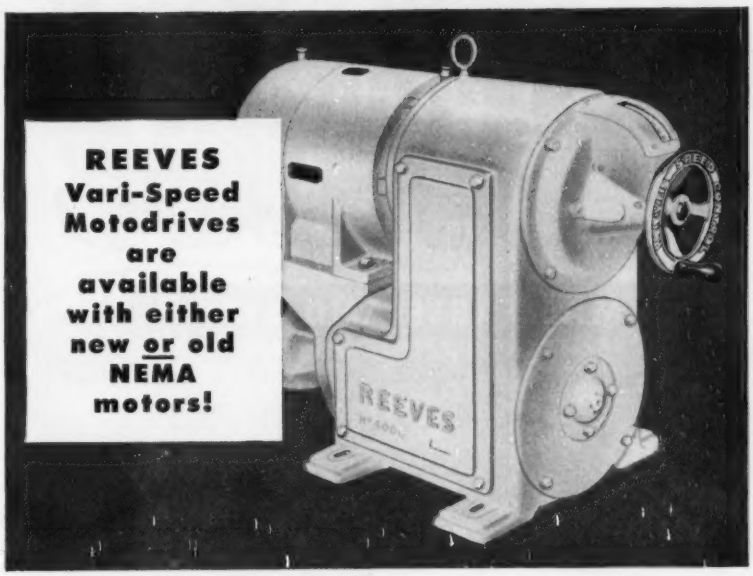

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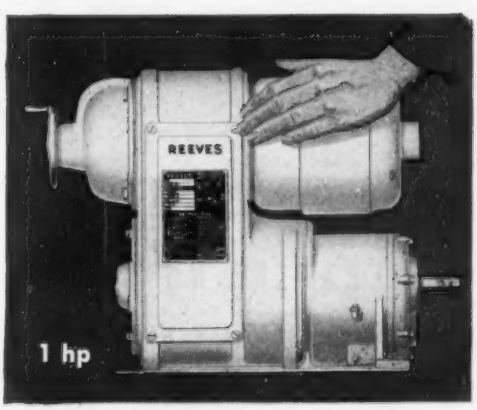

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chart setup, and not an attempt to flaunt his authority or prestige or engage in unreasonable peccadillos and fancies with shop help.

Harry Kaufman
Philadelphia, Pa

•

BACKWARD FOREMAN

Must a foreman be able to run all the machines in his department? Can he keep the respect of the men if his knowledge is more along leadership lines than practical experience?

FOREMEN WHO CAN HANDLE all the machines in their department have never been common in the engineering industry and there does not seem to be any reason why they should be Jacks of all trades. Most of the foremen under whom I have worked had the reputation for being red-hot specialists on some type of machine tool, such as millers or engine lathes, but no one expected them to be able to give a one-man-band performance on all the machines in the shop. They were all pretty average foremen, neither brilliant nor dim-witted, and they did their jobs fairly satisfactorily within the framework laid down for them by top management.

This idea that, in order to criticize, direct, organize and otherwise manage anything, one should be an expert in every phase of the activity is a lot of rubbish, usually fostered by the more wooden-headed type of machine operator. He has usually specialized in one single machine-shop activity which he learned to do when a boy; since that time he has not absorbed a single new idea or picked up any new tricks. In consequence, since he himself could never make the transition from, say, lathe to universal grinder, he cannot see how anyone else can possibly know anything about lathe work and universal grinding, all at the same time. He expects the conductor of an orchestra to be able to perform on every instrument and the musical critic to shut up because he can only play the phonograph.

This attitude of mind is all too common in the average machine shop and it should be corrected with all possible force and emphasis if misunderstanding is to be avoided and bad feeling eradicated. A shop foreman nowadays is an organizer and director of labor and activities within his department and should not be regarded as the fount of all knowledge. There are planners, tool designers, methods engineers, product designers, plant engineers and a host of other specialists in the well-organized manufacturing unit who can

answer queries much better than the foreman can ever hope to do.

Supposing that a man does come to the foreman with a problem? It all depends on the problem. If it is a query on a drawing, it will be one of two types; either the operative cannot understand the drawing because of a temporary mental stricture, or the drawing has a definite error. The foreman can clear up the first problem easily, merely by pointing his finger at the answer which was already plainly visible on the drawing. If neither foreman nor operator can understand the drawing, then the query should be passed back to the man who made it. In effect, the good foreman should not necessarily know the answer to all technical queries, but should have a good idea of how to find the correct answer. If the same operative is having trouble at home and wants to take a few days off to clear up the difficulty, the good foreman who has been picked for his executive, not technical ability, rises to the occasion. He is sympathetic, he gets more details by unobtrusive questioning of the operator and decides on a course of action. While listening to the operative's tale of woe he is making mental calculations at the same time, with reference to shop loading and delivery dates. This is foremanship.

Statistics show that the majority of small businesses fail because of bad management and not through lack of technical ability. In fact, in a recent list of causes of small business failure, technical ability came somewhere near the bottom of the list which was laid out in descending order of importance. An analogous situation lies in the department of a large organization run by a foreman. Here, business failure is represented by low output and high scrap rates together with machine down-time of

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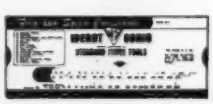

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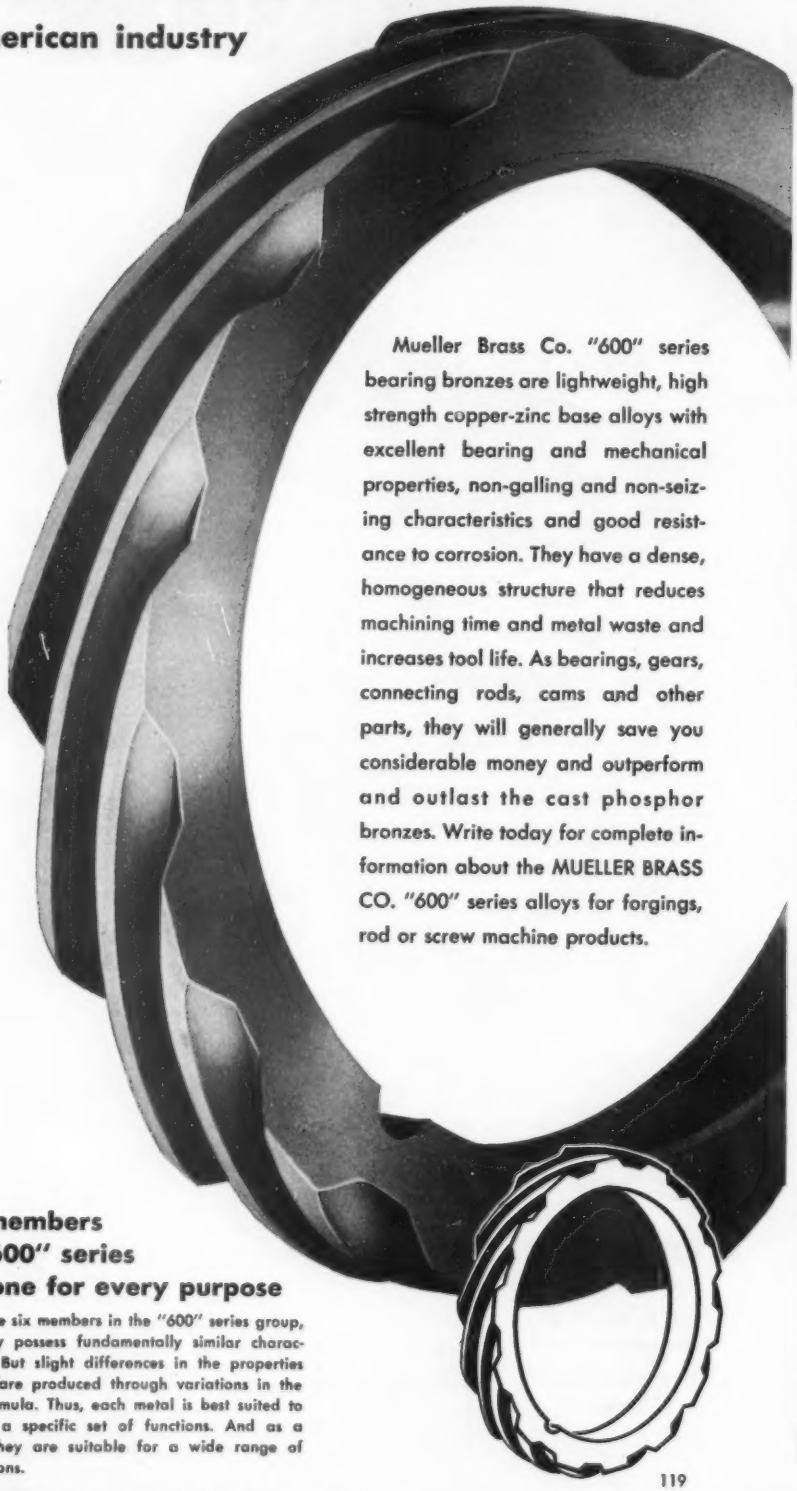

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large proportions. These defects are part technical and part managerial.

As was said earlier, the technical queries can be solved by thorough liaison with the departments directly concerned. The managerial defects can only be handled by the foreman directly, in most cases. The good foreman will be hot on liaison with the technical departments. The bad foreman will worry about his technical troubles in secret and they will get worse.

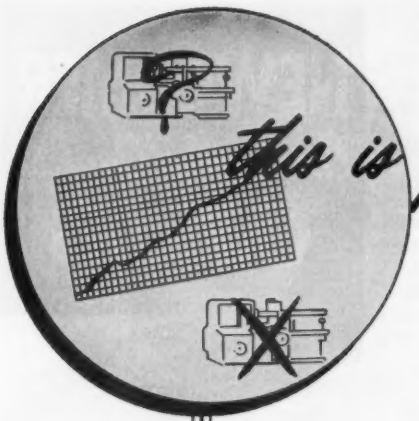
Finally, let's drop this idea that the working of a modern machine tool is something similar to the playing of a violin by Menuhin. Up-to-date equipment is child's play to handle and it is, therefore, nothing much for a foreman to be proud of.

Clifford T Bower
London, England

CAN ANY FOREMAN maintain discipline and respect if he can't handle all the machines in his department? Why not—handling machines is of secondary importance in a foreman. His knowledge and experience of engineering practice and his ability to select, to know, and to handle labor, comes first. That, coupled, of course, with a flair for organizing, is the supreme test and qualification of foreman ability. It is certainly an advantage if a foreman can operate every machine on his section, but if he cannot control and lead, organize and inspire, his value to the company is that of a good machinist.

Highly skilled operators are hired to perform highly skilled machining operations and since this is an age of specialization, the range demanded from any one person is restricted. Most good oldtime foremen will be able to make a show on many different machines but it is doubtful if the younger men will be similarly equipped. It is still more doubtful if

"Morale is very low. I'd suggest rose-colored glass in the welder's hoods."



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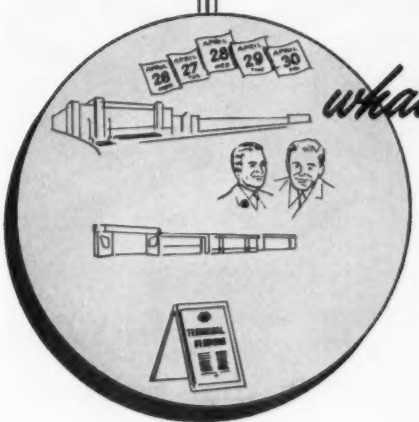

what ASTE is doing to help you

The American Society of Tool Engineers is assembling in Philadelphia's Convention Center on April 26 to 30 inclusive the latest in production equipment and processes available from over 450 manufacturers. The exhibits will be open to you and your key men during these five days, from 9:00 A.M. to 5:00 P.M. Included will be inspection and automation devices, machine tools, accessories, cutting tools, and allied equipment.

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any foreman will be found to be expert on a number of different machines and there would seem to be no point in a foreman attempting to "show how" if he could not do it expertly.

There will be occasions in most shops when a given job may be just that little bit beyond the experience of the operator but that is no good reason for tying up an important executive whose job is to supervise and lead, not to teach and demonstrate. In this connection, the foreman's job is to quickly spot trouble and, if serious, to delegate the work of instruction to some leading operator. If the foreman is an able fellow, he will be in a position to suggest a remedy and leave the experienced operator to demonstrate to the man concerned.

On the other hand, if the trouble is slight, the common sense foreman may put the matter right with a few words of explanation; that can reasonably be regarded as part of a foreman's job. If the foreman makes a habit of operating machines, in order to instruct operators in the way they should go, half a dozen other troubles may build up throughout the shops, the while he is devoting an undue proportion of his time to one. It is sufficient for the foreman to be able to spot the trouble, after which he can suggest the remedy and instruct the man best qualified to see it carried out.

Due to speed of production and the complexity of modern industry today, the shop foreman is called on to exercise some managerial functions. He cannot afford the time to give individual attention to any operator, however important, and whether he can command respect and maintain discipline is not affected so much by his ability, or otherwise, to operate machines, as by his personality. If he

"I forgot to tell you . . . Slim doesn't like people borrowing his tools!"

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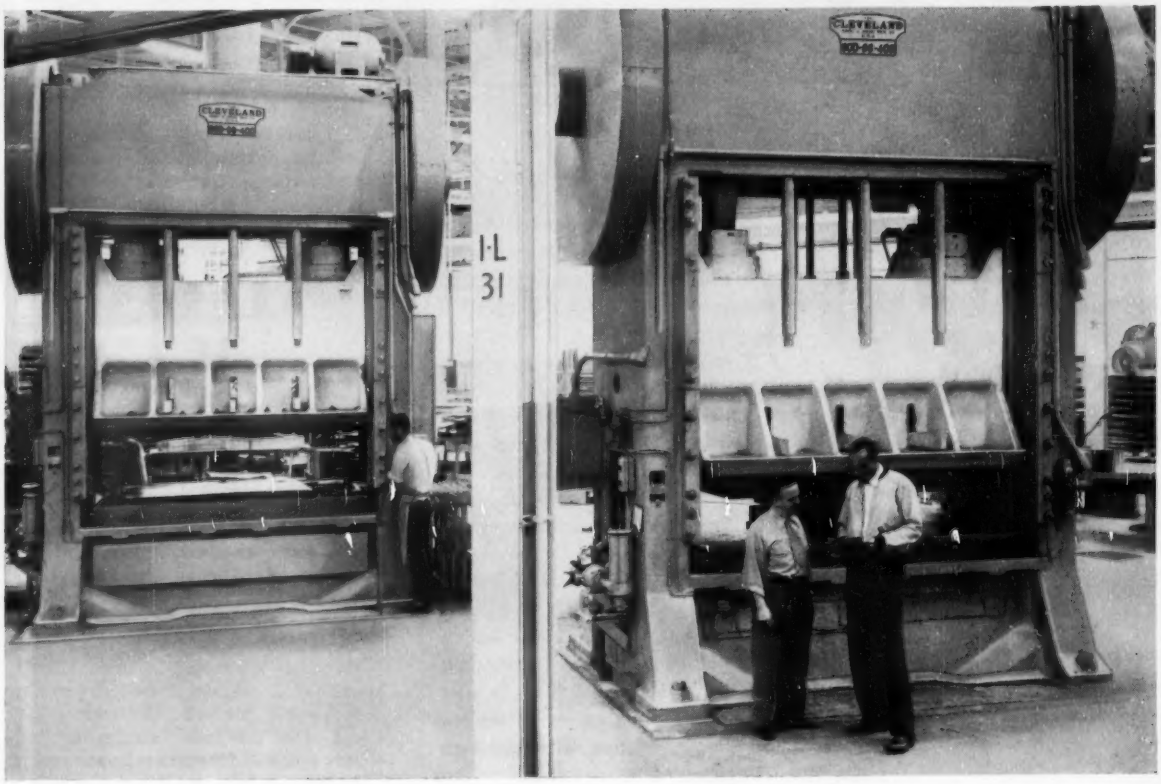
Douglas F4D Skyray, holder of the classic official world's speed record over a 3-kilometer course.

PRODUCE PARTS FOR NEW DOUGLAS F4D SKYRAY



Recently two new Cleveland 400-ton power presses were installed in the Torrance facility of Douglas Aircraft Company's El Segundo, Calif., Division. Here they form many parts for the official world's fastest airplane, the new Douglas F4D Skyray. This bat-winged Navy interceptor holds the international classic 3-kilometer speed mark of 752.9 mph., and the 100-kilometer closed course record of 728.11 mph.

Though not as spectacular, a new Cleveland press is also engineered to speed up schedules—your production schedules. You will find, as have Douglas' production men, that Cleveland presses give lasting accuracy and minimum die wear. You will also find that the (patented) Cleveland Drum Type Friction Clutch not only gives you fool-proof, instantaneous control but that it practically eliminates press down-time. If you are interested in increasing your formed metal parts production at a saving, write or call today. A-9855

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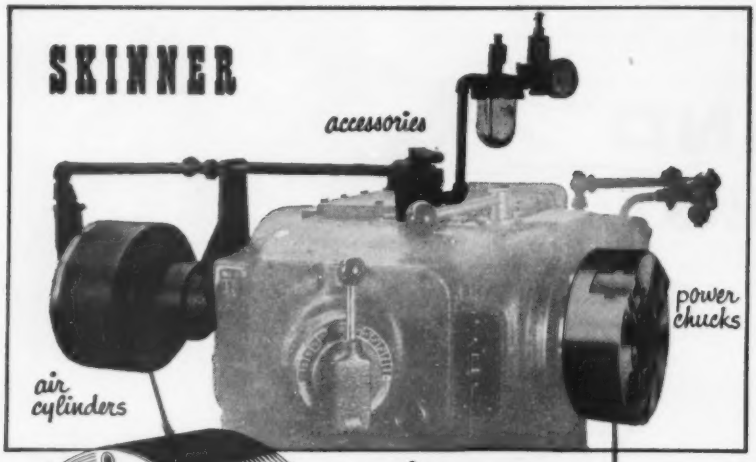

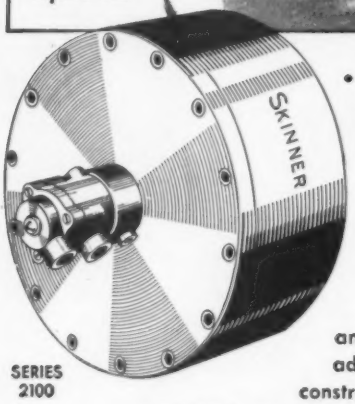

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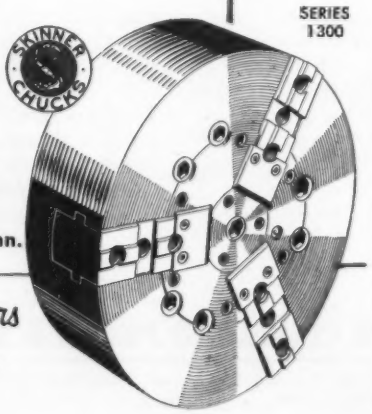
The Skinner line of power chucking equipment has the strength, rigidity and design features so essential for today's production needs. Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates the draw bar. Skinner double-acting rotating (series 2100 for speeds up to 1500 R. P. M.) and non-rotating air cylinders are available with semi-steel bodies for all sizes of Skinner power chucks, and for actuating all types of holding fixtures and tailstocks. Series 2200 double-acting rotating air cylinders have aluminum bodies for efficient operation up to 3000 spindle R. P. M. Skinner accessories include hand-operating valves—complete air unit, including regulating valve, pressure gage and lubricator—filters—soft blank top jaws; draw bars—draw tubes, etc.

Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses"—available for free showings.

SERIES 1300



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203 Edgewood Ave., New Britain, Conn.

Sold by leading distributors in every industrial area

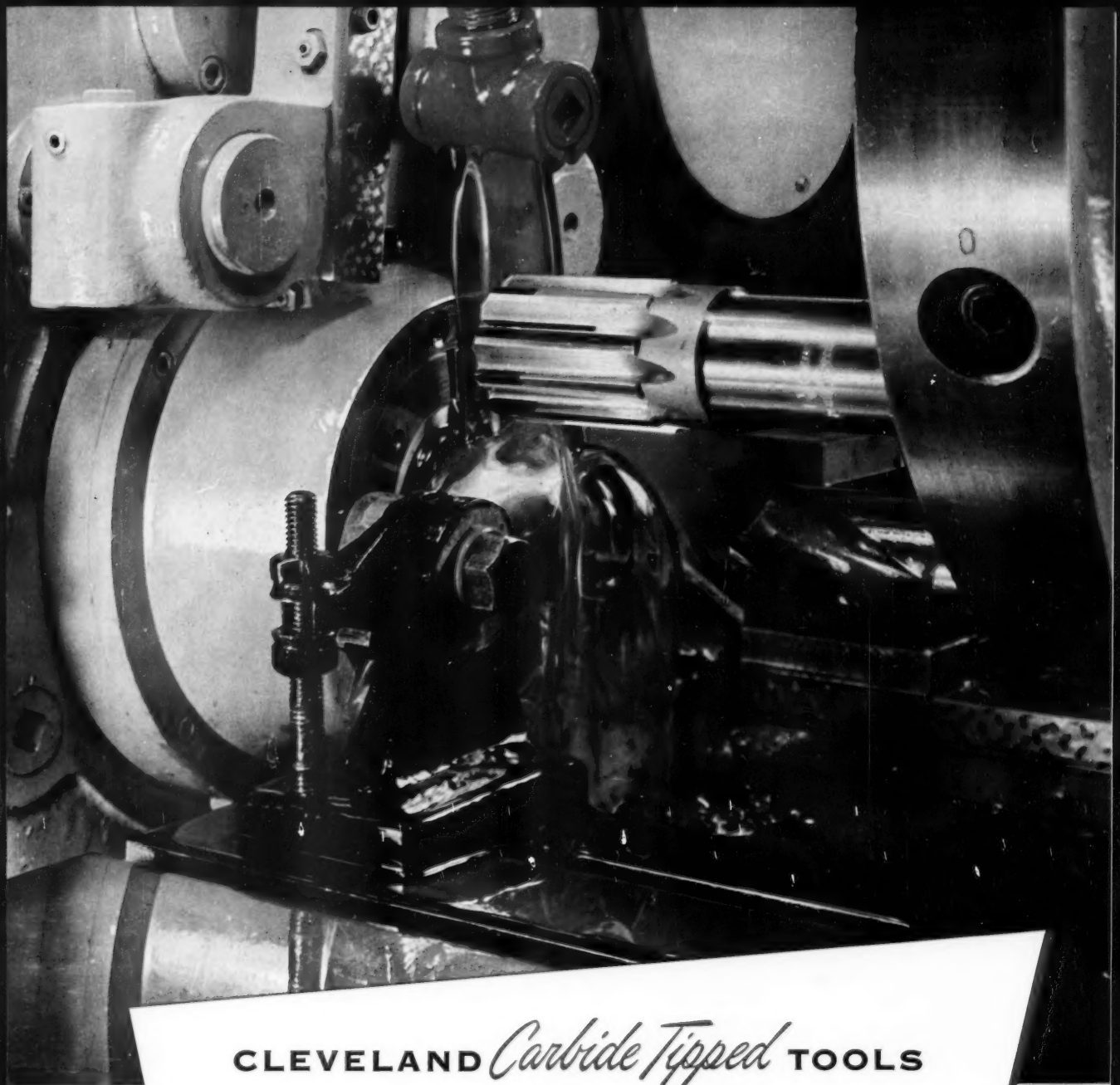
is alert, enthusiastic, capable and fair-dealing, a man who can plan and organize for peak production, who knows his men and how and where to place them, he will find no difficulty in maintaining good discipline and in gaining and retaining their respect.

The ability in a foreman to take the handles impresses the men only in proportion to the skill which he displays. If necessary, he can instruct an operator in the matter of setup, cutting speeds and feeds, finish etc. That means only a few words in passing and does not involve handling the machine or tying up a busy foreman. More important from the production angle is the ability of the foreman to have the right operator on a given machine.

If the foreman feels it necessary to take the handles and demonstrate, he can have no confidence in the operator. If he is intelligent, keen, and resourceful, the foreman need not have been trained as a machinist in order to control a machine section. Many bench hands make good machine shop foremen and in some shops they are preferred because of their trained knowledge of machine construction, adjustment, and maintenance. Keenness and resourcefulness in a foreman will earn more profits than mere ability to handle machines, and may even bring about new and improved methods of operation. Drive, if infectiously directed, will cancel out lack of machine handling experience, and originality and ingenuity can be relied on to keep the wheels turning at a profit. The foreman is an executive, not a trainer, and if labor is insufficiently skilled, a trainer is called for. The foreman's duties lie elsewhere.

I draw the line between ordinary foremen and foremen who are special leaders, as between the static and the dynamic. The ordinary foreman, as I see him, is a comfortable fellow; he has no special urge or desire to

"It has great dielectric strength, and traverse strength, and yield strength, but there's still one trouble with it—it won't hold up!"



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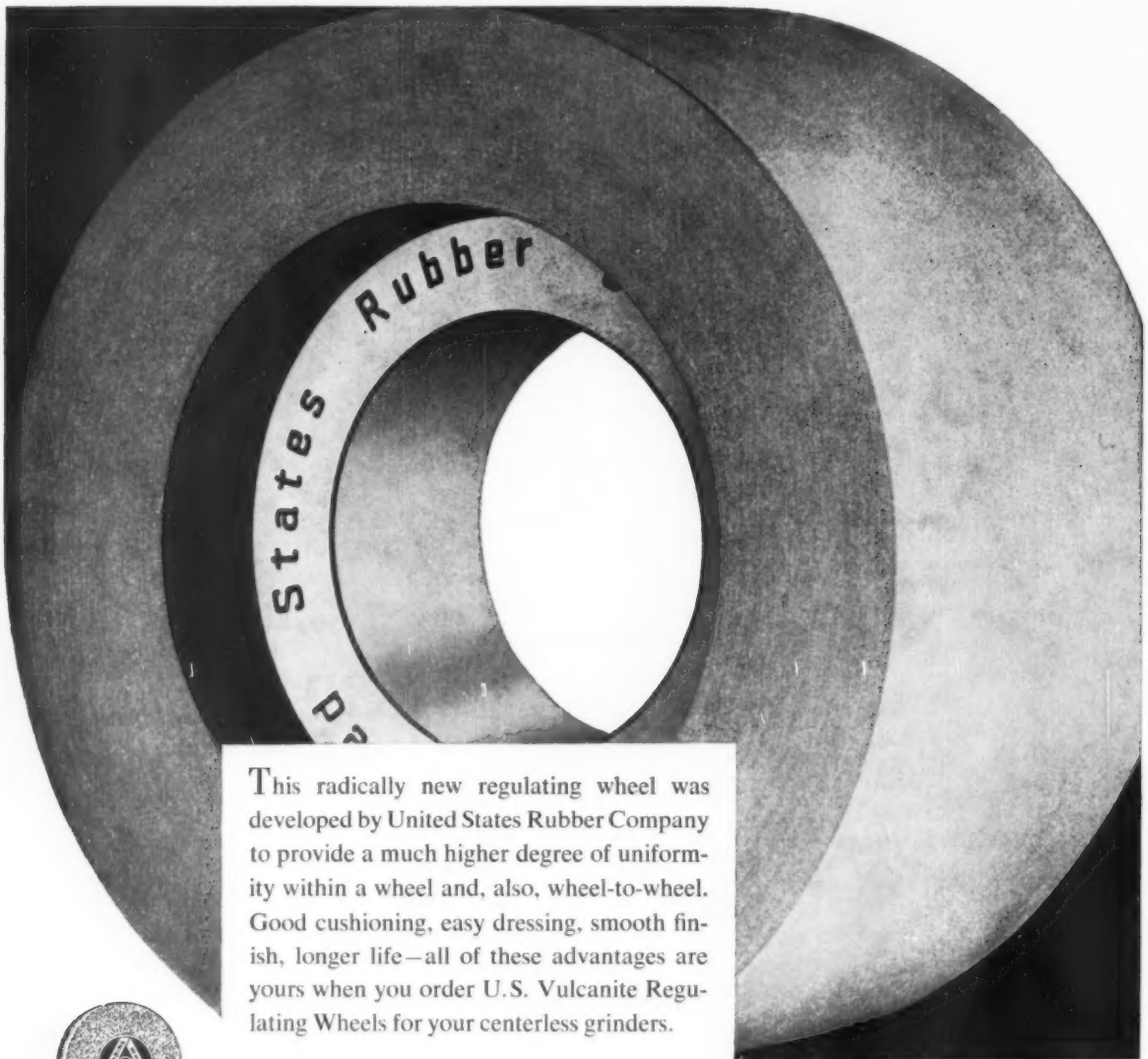
provides a degree of uniformity never before possible



The new U.S. Vulcanite Centerless Regulating Wheel requires less infeed, enabling the operator to hold size better.

This radically new regulating wheel was developed by United States Rubber Company to provide a much higher degree of uniformity within a wheel and, also, wheel-to-wheel. Good cushioning, easy dressing, smooth finish, longer life—all of these advantages are yours when you order U.S. Vulcanite Regulating Wheels for your centerless grinders.

Once again "U.S." engineers have demonstrated how they maintain the 90-year old "U.S." tradition of pioneering in bonds and abrasives. For service and information, write to address below.

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scale the heights,—not for him the glittering prizes. The height of his ambition would seem to be "anything for a quiet life." He has a good digestion, eats well, sleeps well, and his bowel mechanism moves with the certainty and regularity of the solar system. He is placid, affable, obliging and agreeable. The "old man" enjoys a chat with him but never depends on him.

The special leader, on the other hand, is what I call "foreman pressing on the heels of management," the prop and stay of the "old man." His highest achievements leave him dissatisfied in his craving for improvement; he is restless, often relentless in his quest after perfection and his infectious enthusiasms are communicated to all with whom he comes in contact. He can always be depended on. "The world depends on those dependable people, they create a feeling of great security and confidence and to find such is to strike gold. They seem to have magnetic influence and power which invokes wonder and delight"—thus, the special leader foreman.

M Donald
Lanarkshire, Scotland

•

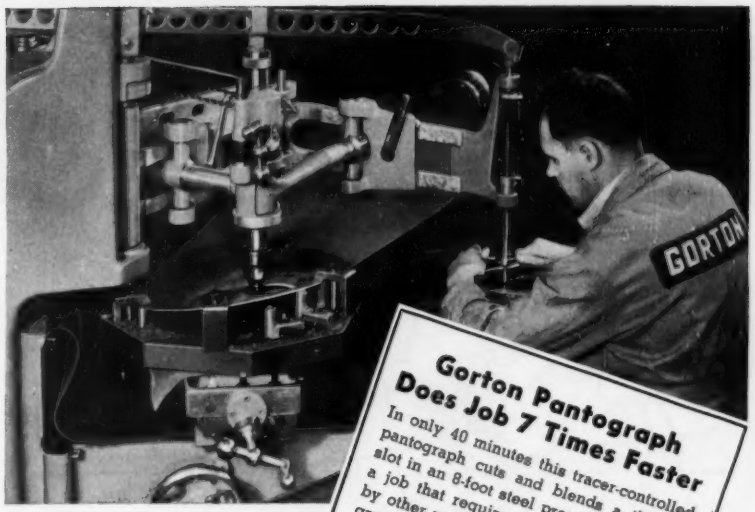
SUPER SALESMAN

How much leeway should the salesman be allowed in the shop? Once he has gained the foreman's confidence, should he be permitted to talk individually to the workers, or must his visits always be supervised?

I READ THE DISCUSSION about the problem of the sales engineer in the shop with great interest.

Ed certainly has permitted the grinding-wheel salesman to take liberties. A salesman or sales engineer should never be permitted in the shop without the permission of the foreman. Besides, the salesman should certainly know better than to take any action that will antagonize the foreman, no matter how popular it may make him and his product with the men in the shop. The men may be the ones who are going to use his product, but they will never see it if the foreman does not put through the purchase order.

Al is right about the salesman picking up plenty of know-how from visits to other plants and from his past experience at solving problems for other shops. If Ed feels that the salesman does really have some worthwhile information to offer he should arrange to have the salesman give a demonstration to a selected group of employees. This instruction



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In only 40 minutes this tracer-controlled pantograph cuts and blends a thermal slot in an 8-foot steel propeller blade — a job that requires 5 hours 10 minutes by other methods. This is typical Pantograph performance — one of hundreds of examples.

Gorton Pantography Brings *Creative* Production to Your Plant

What's *your* problem in machining? Depend on Gorton Pantography to help you *create* a new production method if your problem falls into any of these categories:

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Cylindrical
Square
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Gorton Pantography works in two or three dimensions, in all directions on a horizontal plane, and vertically. It uses enlarged masters, templates or patterns — easily and inexpensively made. Normal operation takes advantage of the reduction ratio principle for increased accuracy in the work piece — an exclusive pantograph benefit.

Whether a dozen or a thousand pieces, each is identical in shape and tolerances to the first. Operation during cutting cycle is manual or automatic, and work piece size varies from the diameter of a dime to areas as large as ten feet.

Clip the coupon for your copies of the Gorton catalog and the helpful booklet, "Pantography."

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Complete regular equipment includes thread indicator.

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BATAVIA, OHIO

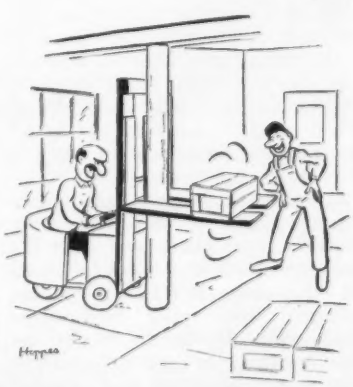
should be given under the supervision of the foreman and the salesman should be told to limit it to the particular problem at hand. In addition, the salesman should be told just how much of the men's time he will be allowed to take up. After all, the company is footing the bill for the time and as the company's representative it is the foreman's duty to see that the firm is getting something for the money it is spending.

Any purchases which are made should be based on the merits of the product. If the foreman does not have an opportunity to determine the relative merits of the various makes of wheels available, he should order sample quantities from each of the reliable manufacturers for trials. It would be futile to try to have the entire shop come into agreement on the results of these trials. Therefore he should have a few experienced men use these wheels on various classes of work, and, as soon as possible, he should discuss the results of these tests with the men in an attempt to reach a decision. It would be wise to instruct the men to make a few written notes about each wheel as they go along with the testing.

The only safe and sure-fire solution to the problem of "free loot" is to refuse to accept anything. The things that are given out are seldom worth very much. In any case the dissension and ill feelings which they cause are always far in excess of the value of the articles.

As a general policy the salesman should be kept off the shop floor except for supervised demonstrations. Any foreman who permits salesmen to roam around the shop is really sticking his neck out. It may not seem serious at the moment, but just wait until the salesman is involved in an accident, injuring himself or an employee.

H G Koslow
Bronx, NY



"All right, you've had your joke — now unload it!"

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STURDY
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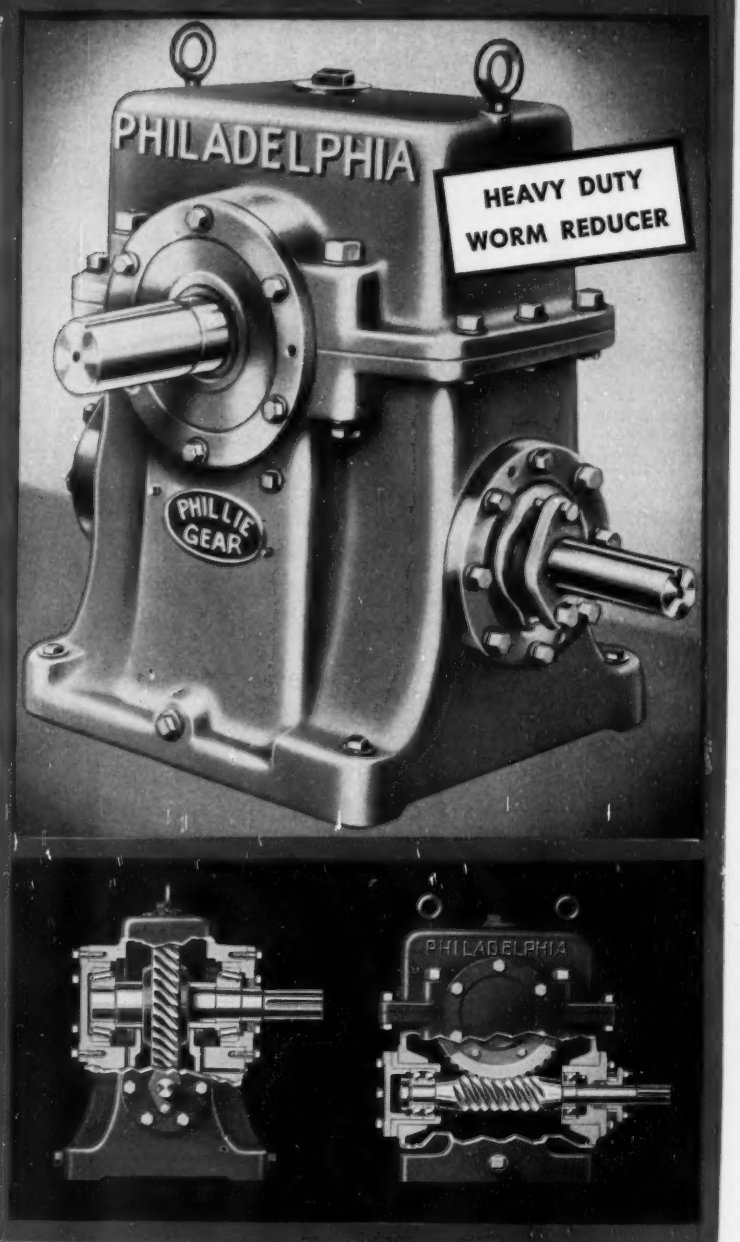

Why do we say Precision-Built?

Because . . . just as much research, design and engineering have gone into the making of these Heavy Duty Worm Gear Reducers as that of the finest time piece.

Material and manufacturing standards are very rigidly maintained in producing Philadelphia Worm Gear Reducers with the result that long and efficient life is effectively built into these units.

Worms are of alloy steel with carburized hardened and tempered threads, both shaft and threads are smoothly ground and polished after heat-treating.

Worm Gears are made from the highest quality chilled-cast nickel bronze.

Bearings are anti-friction types (ball or roller) insuring smooth, quiet, long-lived performance.

Housings are oil-tight quality grey iron . . . designed to assure maximum *rigidity* and heat radiation, with ample oil reservoir.

Units are available with Worms *above* or *below* the Worm Gear; also with shafts up or down for Vertical Drives.

A complete range of sizes are available to cover any application up to 265 H.P., with ratios from 3⅝:1, to 6300:1. They are built to provide *efficient* and *dependable* power transmission under the most *rigorous* conditions over a long period of time, at very *low maintenance cost.*

For further detailed information write for latest catalog WG-51.

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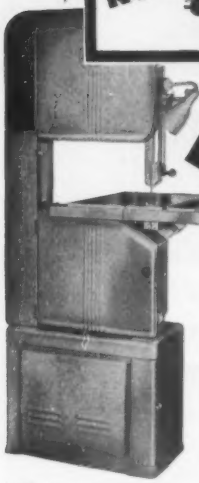

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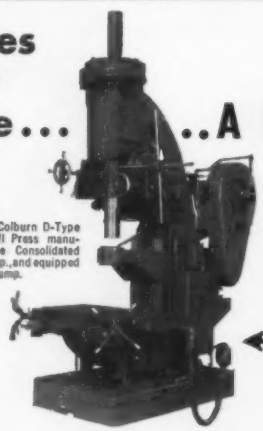


Illustrated is a Colburn D-Type Heavy Duty Drill Press manufactured by the Consolidated MachineTool Corp., and equipped with a Gusher Pump.

You get split second coolant flow, controllable as to volume, with a Ruthman Gusher Coolant Pump. There is no need for packing or priming and the pre-lubricated heavy-duty ball bearings need no further attention. You'll save valuable time for the entire life of your metal cutting machinery when you specify Gusher Coolant Pumps.

Write now for full information.

THE RUTHMAN MACHINERY CO.
1818 Reading Road, Cincinnati, Ohio

THE PERSON WITH THE EXTROVERTED temperament required for good salesmanship is extremely lucky in the fact that the rewards for successful selling are higher, proportionally to education, preparation, and training, than in any other vocation or profession. This does not mean that good salesmen are born, for training is as important here as elsewhere. But it is a fact that to be a successful salesman one must have the initial temperament for it. Those who like to mix with their fellows, who are adaptable, but who have a strong streak of domination in them, who like talk and argument, and who prefer action to thought are best suited for this field of employment. However, a salesman is crowding his luck when he lets his zeal in selling his product override his judgment and discretion to the extent of indulging in underhanded tactics to make a sale.

It is a truism that the sale takes place in the mind of the customer. For this reason the technique of salesmanship is very largely concerned with the thought processes of the customer, and might be referred to as a form of applied psychology. The mental states through which an individual's mind passes in the act of making a purchase consist of aroused interest, desire to possess, appreciation of need for the article, conideration of cost, and decision to buy. In the actual act of selling, the salesman is concerned primarily with inducing these mental states in turn in the mind of the prospective buyer.

There is, however, in salesmanship much that is extraneous to the actual act of selling. The engineering salesman, for example, will have success or failure in his attempt to sell his product governed by what he does prior to making the actual sales pitch to the buyer. He should have

"Awright! What wise guy put this baby bottle here?"

a carefully prepared plan of action based on data gleaned from many sources of the specific needs of his prospective purchaser. The technique of good salesmanship requires that he have this pre-knowledge.

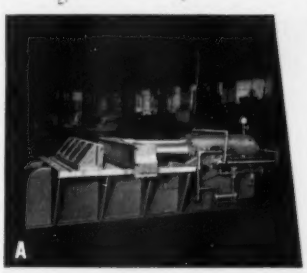
How can he obtain this information? Well, for one thing, he should attempt to obtain permission to visit the shop of his prospective buyer with the idea of spotting possible improvements in production and performance of machines through the use of his product. He should impress the shop foreman with the fact that this extended courtesy to go out on the production floor will result in ultimate benefit for the prospective buyer. Once this courtesy opening is obtained, the vital part of the actual sale can be undertaken.

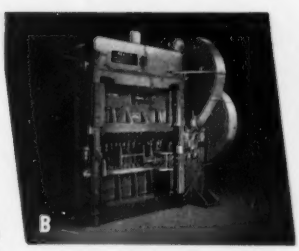
It should be unnecessary to add that a salesman comport himself in such a manner that no reflection on his character results. The product he is attempting to sell may unfortunately be judged by his sales technique. Of the various attributes and qualities essential to full success as an engineering salesman, those of exceptional importance are knowledge of his product, adaptability, and integrity of character. To some considerable extent, the measure of a salesman's success in getting orders will be the measure of his success in establishing the right relationship of mutual trust and regard between himself and his customer. The keenness of competition today has resulted in merchandise attaining a consistently high level of quality, and in certain circumstances whether or not a particular salesman obtains the business will be determined by whether or not he is liked by the buyer. The factor of sentiment weighs when other things are equal. The use of high pressure tactics and underhanded actions will not endear

"Aw'right, aw'right. I'll start a lil' earlier so the coolant will be warmer for ya' . . ."

stamina + speed

On the cinder path, some runners perform like machines. They can maintain a steady speed and grueling pace for miles and miles. Then one day, as age overtakes them, they burn out and fall by the wayside. BEATTY machines are designed with "built in" stamina and speed. Unlike frailer performers, a BEATTY machine lasts for years and years. Your BEATTY built machine needs no training, no special diet, no personal pampering to keep it at peak efficiency for the "long runs". One of the machines shown should answer your production requirements. If not, our engineers will be happy to design and build to your exact needs.





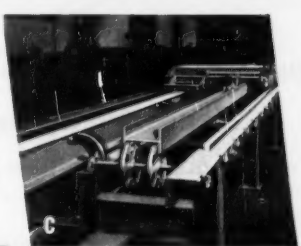
A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

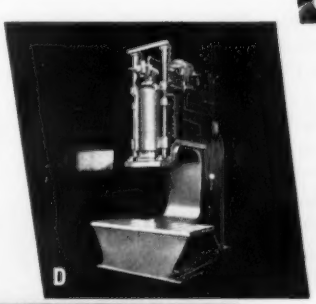
B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

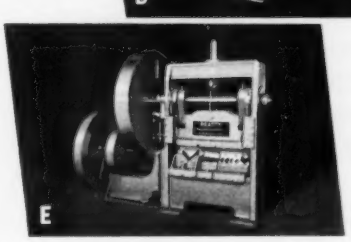
C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

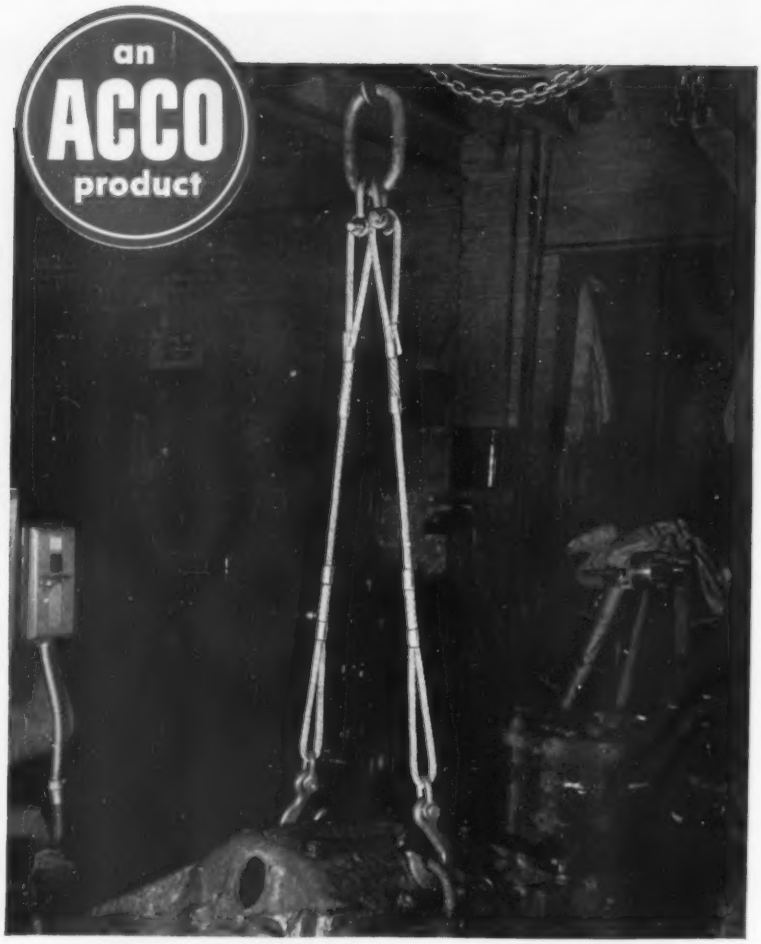
E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.







BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA



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the salesman to the prospective buyer. The petty bribery of free loot should not be tolerated.

In the case under discussion, the engineering salesman erred in attempting to sell the desirability of his product and the worthlessness of competitive products to the men on the machines, short-circuiting the foreman. Disparaging remarks about a competitor's product is a negative sales approach. The shrewd, experienced salesman does not resort to such tactics. He sees to it that the proper authority is granted to demonstrate the worth of his product. In the presence of the foreman and workers he puts his grinding wheels to the test and endeavors to show how they can help the prospective buyer to do a better job. He sells the foreman by specific demonstration and data that the article has been engineered to do the best specific grinding job on specific material.

Do engineering salesmen have the right (or duty) to go out on the production floor to demonstrate their wares? Emphatically, yes! Manufacturers of machines and accessories are constantly working out better, faster, and less expensive products. Higher standards of quality, precision, and dependability are assuring users of better engineered equipment to help the buyer make a better product at a better profit. The shop foreman would be derelict in his duty to the company if he failed to welcome the chance to obtain a demonstration of any device to better performance and production in his shop. A good engineering salesman should be permitted the chance to talk with the foreman, and the workers, to swap hints on how to obtain faster speeds, heavier feeds, etc.

The engineering salesman can do a great deal of good when he comes

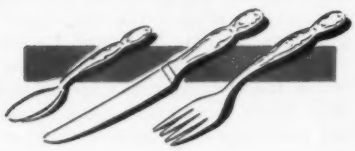
"That one really is top secret . . . done in invisible ink!"

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Invisible Cracks and How They Were Cured



One of our customers reported trouble with a roll used in the making of fine silverware. Made of A-H5, our 5-pct chromium air-hardening steel, the roll was of 6-in. diameter with a 10-in. working face, highly polished. It worked fine at first. Then a fine network began to show up on the silverware being rolled.

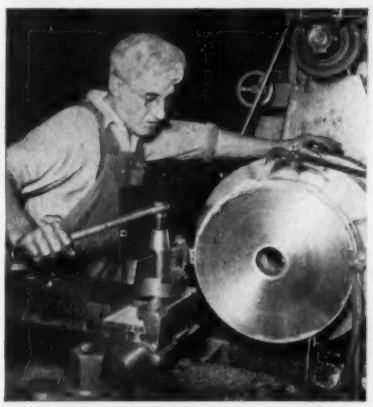
We suggested that the customer bring the roll to our plant, where we have the most modern facilities for diagnosing ailing tools and dies. When the roll was magnetic-particle tested, what appeared to the eye as a beautifully polished surface was revealed to be a fine network of grinding cracks.

"Never had that kind of cracks before," said the customer. "Can we get rid of them on a roll of such high hardness?"

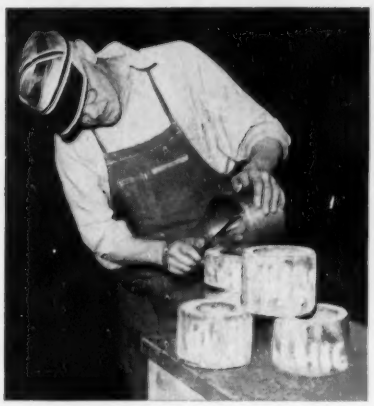
"Yes," we replied. "But it's going to be a tricky job." So we checked with the experts in our division that produces hardened steel rolls. "It's not easy," they told us, "but it can be done. Use a wheel with a very coarse grit with a soft binder. Remove the surface at a maximum rate of .0005 in. per pass. You'll clean up the cracks somewhere between .005 and .010 in."

Then we checked with our specialist on grinding wheels, who gave us the exact code numbers for the grades of wheels that would make it possible to salvage the roll—and also prevent the recurrence of grinding cracks. Our customer went away well satisfied . . . and he's still using A-H5 with fine results.

Bring your tool or die troubles to our technical staff for advice that's based on years of practical experience—not just in making fine tool steel and in helping customers solve their problems, but in using hundreds of tons of our own tool steel each year in our manufacturing divisions. Perhaps we can help *you!*



This piece of Omega tool steel, tops in resistance to cold shock, will see service as a retainer block for a header die that is subjected to terrific loads in the cold-heading of steel artillery shell cases.

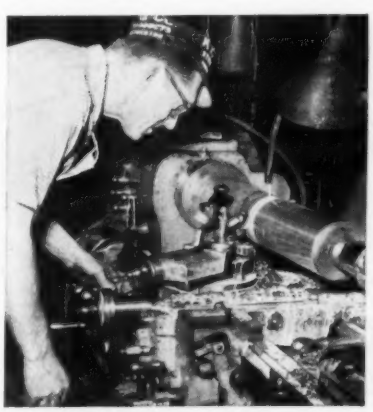


Some rough forgings of Lehigh S tool steel provide an interesting contrast to the finished liner for a tapering die which puts the desired taper on a 105-mm shell case after it has been headed.

COLD-EXTRUDING CALLS FOR GOOD TOOL STEEL

Great advances are being made in the technique of cold-extruding steel. It's a development that opens up new horizons in metalworking. The severity of this type of work calls for a variety of blue-ribbon tool steels—some must have the ultimate in wear-resistance, others must withstand terrific shock.

Bethlehem tool steels are in plentiful evidence wherever cold-extrusion tools and dies are being made. The accompanying photographs, made at Carando Machine Works, Stockton, Calif., show punches and dies being made from Bethlehem tool steels for use in the cold-extrusion of steel shell cases.



A bar of Lehigh S is being turned in a lathe to form a draw punch for a 3-in. cartridge case. Lehigh S has the highest wear-resistance of Bethlehem's high-carbon, high-chromium grades. It also holds to accurate size in heat-treatment.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Avoid sharp corners in designing tools

Tools designed with sharp corners, such as in square holes, can often be produced satisfactorily when liquid-quenched tool steel is used. However, such designs are often so hazardous that a large percentage of cracked tools can be expected, no matter how carefully the heat-treatment is performed.

When the sharp corners are not necessary, the solution is of course to provide fillets. But when square holes or other sharp corners are essential in the design of the tool, the use of an air-hardening steel is recommended.

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out onto the plant floor. His specialized knowledge and experience enable him to offer ideas on how to use his product that would not occur to the foreman and workers. However, the salesman's opportunity to talk to individual workers in a shop should not be taken as an occasion for petty bribery to sell the workers on the merits of his product, without the foreman's knowledge. A wise salesman will not spoil his reputation and the chance of future sales by unauthorized and unethical practices with individual workers behind the foreman's back.

The welcome mat is put out for the engineering salesman by all wide-awake and progressive foremen. The foreman will find that most engineering salesmen are everyday working men, experienced in meeting special problems in their field, and backed up by confidence and knowledge that comes from training in a specialized field. Their recommendations for doing particular jobs based on their engineering skill and knowledge should be invited as a means of bettering quality and performance. They will save time and money, and may prove of inestimable value to the company.

Harry Kaufman
Philadelphia, Pa

•

TOO OLD TO LEARN

Is there a specific age at which a worker is "too old to learn," or isn't it rather a mental state, occurring at any age? Who is to decide when the point has been reached?

OF COURSE ED IS RIGHT. There is no fixed age at which anyone is too old to learn, just as there should be no fixed, or arbitrary age for retirement. In both cases it depends on the individual. When a foreman reaches the point where he cannot, or will not learn new methods, either of doing work or of handling men, he has reached the retirement age. There are of course too many foremen who allow themselves to believe that they know all about machining methods and about handling men under them. Such foremen are ready for retirement, regardless of their age. They can do more harm in a shop than most of us realize.

Some shops have what they call refresher courses for both worker and foremen. The first World War taught us a lot about things of this kind. We took men and women of almost any age and trained them for doing war work they had never heard of. I recall one Italian barber, well over 65, who made a fine turret lathe hand on making shells. He

earned as much per day as he had previously in his little barber shop in a week. He had never been in a machine shop before and was a little afraid of the machines at first. But a short time in the training school taught him how to do good work.

It was during this period that the refresher course came into being. It frequently happened that we took men and women from the training school and put them in the production line before they had been in school quite long enough to really know the job. While they could make shells and other parts fairly well, they were not well enough grounded in the work to get the production from the machines. So they went back to the school for a short time. Of course some never became really expert, as was to be expected. But we were all surprised at the way in which men and women who had never seen a machine shop before could be taught to run machines and boost our production when it was badly needed.

Ed had a right to be peeved at a ruling based on his age, which barred him or anyone else from the advantages of the supervisory course at the State University. It is possible that some men over 45 might take Johnson's ruling as a compliment, feeling that it meant the big boss felt that they already knew all there was to be known, which of course nobody does, not even the big boss himself. A man like Johnson, who seems to have put over the ruling, is a menace to the welfare of the company and should probably be retired himself, regardless of his age.

Harrison should have reminded Johnson that the big boss himself felt that age alone was no barrier to learning new ways by recalling that he occasionally brings in experts

"Hey, boss, somebody better do something about sharpening this cutting oil!"

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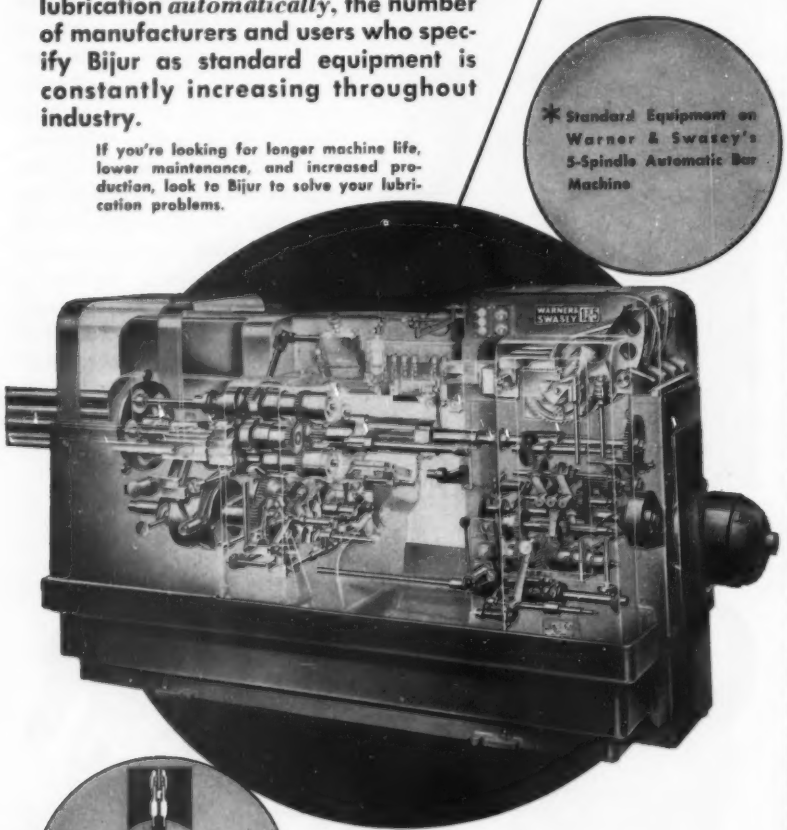

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from the outside to show him how his business can be run more efficiently. The big boss left 45 behind years ago, long before he became head of the company. Yet he brought in a crew of industrial engineers to show him how to save money in handling the business. Perhaps Harrison should also be retired if he cannot insist on doing what he feels to be the right thing for the men and for the company.

Fred H Colvin
Point Pleasant, NJ

•

HOTSHOT FATHEAD

Is there any solution to the problem of trying to maintain peace in the department if you have a first-class machinist who won't keep that fact to himself? Is it better to fire the man, or try to point out to him that his arrogance infuriates everyone else?

MEN WHO CANNOT CONTROL their temper and think they are better than anybody else create unrest everywhere, not only in machine shops, but in homes and among nations as well.

However, there is a lot of exaggeration in the expression of "a whole shop stepping lightly just to keep one man happy." The workers themselves would see to it that this never happened. Not until hotshots and fatheads are endowed with power as part of executive positions, or the possession of a lot of money, are they a menace to a larger group of men. But where they have been able to rise to a high position they are very likely to show those under them who is who. In such places they hire and fire and don't care what inconveniences they put others to. People lose their jobs and some who may have been employed by the same company for decades might be discharged for no reason at all. I know many such cases. And they are even considered "strong men" by many manufacturers—"men who get things done," etc.

The terror created in places where they are in charge is considered by many high brass as necessary to hold or increase a certain production. It would be easy to name several who have risen to the highest ranks simply because they knew how to use the whip. A real leader on the other hand treats the fellows as human beings. Yet, some of them have written books telling the world how it hurt them when they had to let some of their men go. This is a real abuse of power, exactly the same kind as is used politically by dictators. But

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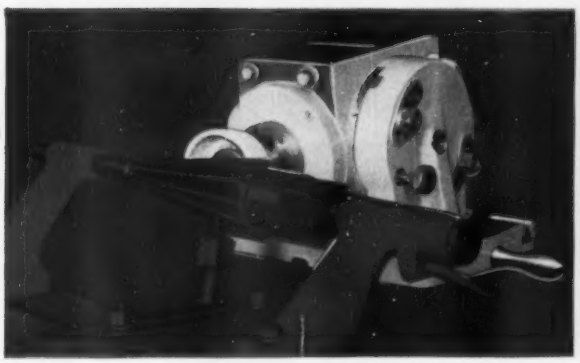
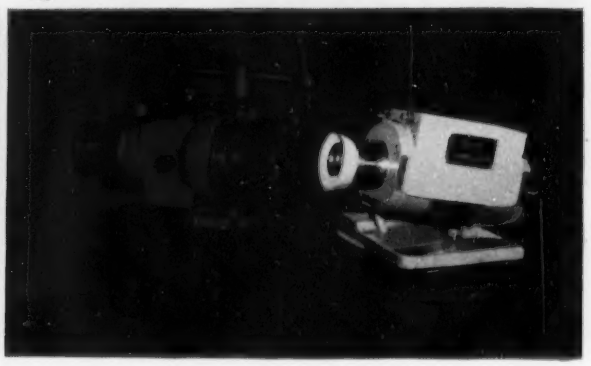
With Angular Adjustment In A Vertical Plane





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2. Cup wheels produce a cutting edge on tools that lasts longer because it is stronger.
3. The tooth rest remains on the center line of the cutter for practically all grinding on centers or in the work head.
4. Most cutters and reamers can be ground all over with one set-up, using the swivelling table and Pope tilting head. The usual second and third set-ups are no longer required.
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6. The right clearance angle is assured on tools difficult to grind, such as slab mills, taper reamers, angular cutters and form tools.
7. 3600 R.P.M. — one wheel speed — safe for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
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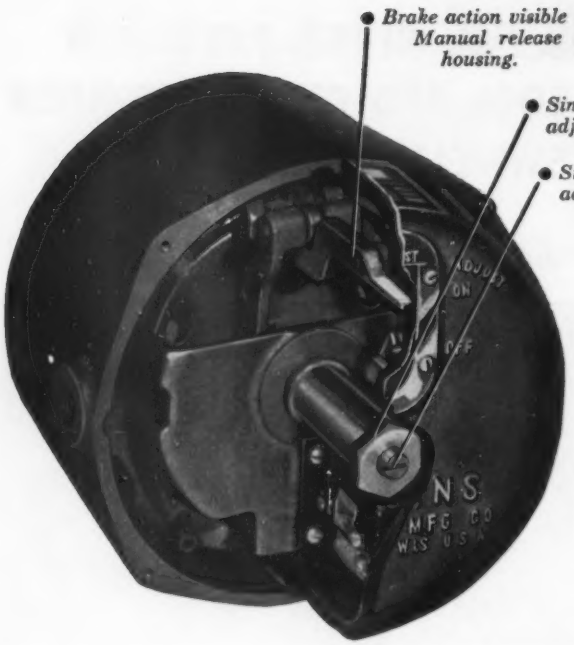

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the economic abuse exercised by many a hotshot may play havoc in the families concerned. That this is dangerous policy in the long run and liable to increase socialistic thinking, doesn't seem to influence those who make all the important decisions. What a detrimental thing it would be if the free enterprise system, which we now enjoy, should be curtailed just because the hotshots and fatheads in our countries go too far in their ambition. They should learn how to increase the workers' and staff members' voluntary interest in their employer's business, instead of commanding them to do more work.

Many a fathead wants to make a career and doesn't think it is wrong to step on other peoples' toes, ruin a fellow's future, or even tell lies about him. He got his job perhaps on his engineering education and bluffed himself through, even if he was unable to handle men correctly, or didn't care to.

Hotshots and fatheads are very quick to find faults with others, both above and below them, and accuse their helpers of mistakes they really committed themselves. Yet they are often excused, or even patted on the shoulder if they—as Smith—have been able to make their boss believe they are good workers, or have an easy tongue.

I have often wondered if those guys, whether workers or executives, are not mentally deficient—perhaps they are closer to the jungle than the rest of us, or else they are ill, and should be interned at some medical institution. In one case, I know a manager who took his bawling-out of men so seriously that he got all tired out, and his boss had to send him away to get a rest. Under the influence of hot temper most crimes are committed, and perhaps these guys are inclined by criminal desires

"Wake up, Joe, we're in the shop! . . . Joe! . . . Joe . . ."

Mattison Grinder beats old time (15 hours) by 12 hours

The picture above shows a punch and die grinding operation on a Mattison High-Powered Precision Surface Grinder at Lyon Metal Products, Incorporated. Previous time on a converted planer-grinder was 15 hours — now with a Mattison Grinder equipped with special fixture, grinding time has been reduced to 3 hours.

Mattison Grinders are proving profitable investments in plants where "time out" for reconditioning is a vital factor in meeting production schedules. Surfaces are reconditioned and edges sharpened in a minimum of time, eliminating costly delays and holdup of production. Many manufacturers installing the Mattison Grinder for reconditioning dies find many other uses for it in grinding flat surfaces where accuracy and fine finish are required. For complete information on the Mattison High-Powered Precision Surface Grinder, send for free copy of our latest circular.

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GOSS *and* DeLEEUW
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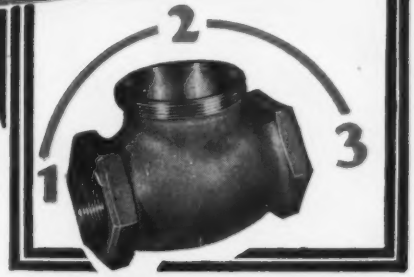

This recent Goss & DeLeeuw development has already received universal acclaim as an outstanding development.

In speed, ease of tooling and precision finishing, the "1-2-3" chucker provides engineering advantages which result in vastly greater production at a fraction of parts' costs by other methods.

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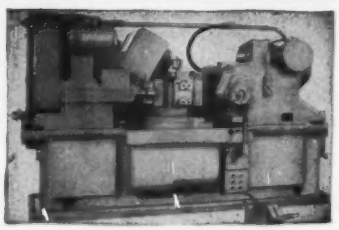
"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence — a method exclusive with Goss & DeLeeuw and offered on this machine.



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to treat their fellowmen badly.

It is true, too, that a few hotshots are geniuses in some line of work or duty, but their unbalanced state of mind does so much harm that they should be kept short. Under no circumstances should a man be appointed to control others unless he can control himself. Science has proved that there is very little difference between the brains of a genius and that of a lunatic.

I suppose some of these men's minds might be corrected by talking to them.

If Smith's case alone is considered it should be put before the labor relations committee, if such a committee exists. But if this does not produce any results it would be best to put the man and his jig borer in a room by themselves. This is often done with jig borers for other reasons.

Before any definite steps are taken, Al should call Smith to his office and have a man-to-man talk with him. It is a poor idea to down-grade any man of this type if he is wanted. That would certainly make him leave pretty quick. If the man is unreasonable, it is best to dump him. No man should be important enough to stop production for any reason; if he is kept, and he becomes sick, or dies, the work goes on.

A E Fristedt
Stockholm-Bromma, Sweden

"A HALO HAS ONLY TO FALL a few inches to become a noose." The conceited know-it-all who goes around with a self-made halo of superiority is surely bound for a fall. When his continued arrogance keeps the department in which he works in a turmoil, and his superior and overbearing behaviour affects the orderly functions of the rest of the workers, it is time for the foreman to place a noose around the offender's neck and yank him out of the department. It is well known what one rotten apple can do to a barrel of sound ones.

It is unfortunate that some men, while skilled in the work they do, possess a minimum of intuitive appreciation and understanding of what is fit, proper, or right in their relations with fellow workers. They show no mental discernment in saying or doing the proper thing, so as to win good will, or in avoiding what would offend or disturb others. In short, they have no tact in their dealings with those around them. People work most efficiently and happily with those who have cooperative attitudes, and a toleration and respect for others. Organization morale is an

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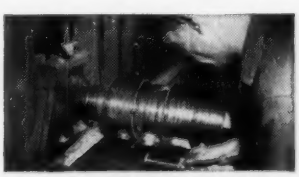

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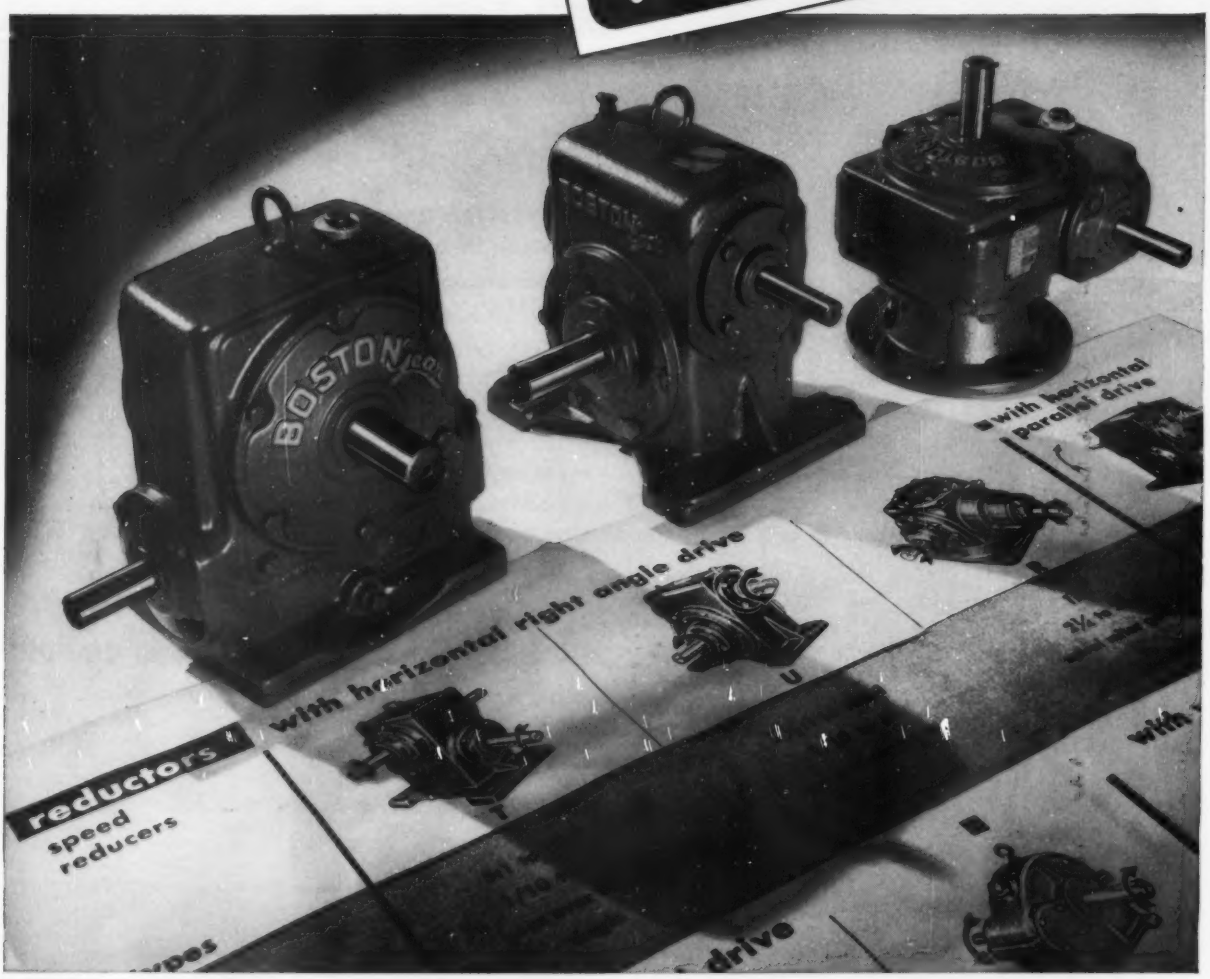
Stocks of tube, rod, bar, strip, sheet and wire in a variety of alloys.

means approval by 250,000 cost-wise buyers

EQUIPPED WITH BOSTON Gear STANDARDIZED PRODUCTS



STOCK GEARS — 2000 TYPES and SIZES

SPROCKETS and CHAIN

SHOLD-A-GRIP Interchangeable Tapered BUSHINGS and SPROCKETS

RATIOMOTORS

REDUCTORS

A $10,000,000 STOCK • AT 92 LOCAL DISTRIBUTORS

SHAFT SUPPORTS

UNIVERSAL JOINTS

COUPLINGS

Design around the Speed Reducers that add service life . . . and extra sales

It's good sales sense to specify BOSTON Gear REDUCTORS or RATIO-MOTORS when your product's design calls for speed conversion.

BOSTON Gear is a name your prospects know and trust. It's also your lowest cost *insurance* of customer satisfaction . . . and repeat orders. Here's why:

1. **LEADING SPECIALISTS** in standardized machine drive parts for 75 years.
2. **LARGEST PRODUCTION** facilities, serving 250,000 customers in all industries.
3. **HIGHEST QUALITY.** Assures immediate interchangeability, anytime, anywhere.
4. **LOWER COST.** Longest service life assured by BOSTON Gear quality.
5. **WIDER RANGE** of standard types and sizes. REDUCTORS. 005 hp to 36 hp — RATIOMOTORS 32 types, 1/20 hp to 3 hp
6. **NEARBY STOCKS** at leading supply centers . . . the nation-wide network of 92 BOSTON Gear Distributors . . . with stocks totaling $10,000,000.

These are more than advantages . . . they are *essentials* to trouble-free planning and servicing of any product assembled with standardized stock parts. Only BOSTON Gear offers them *all*. Compare — and you'll agree — it pays to "Design around BOSTON Gear."

For advice on speed conversion problems, talk with a specialist, the BOSTON Gear Field Engineer. Ask your BOSTON Gear Distributor to arrange a call, or write: Boston Gear Works, 60 Hayward Street, Quincy 71, Mass.

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Industry's most valued "textbook" of drive design and maintenance . . . includes 30 pages of Engineering data.

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BALL BEARINGS

Look under "Gears" in the Yellow Classified Section of your Telephone Directory for the BOSTON Gear Distributor nearest you.

Eleven styles of top-quality standard carbide tools ... tipped with ADAMAS tungsten carbide in grades for steel, cast iron and non-ferrous materials. Here is the unbeatable team for your turning, facing and boring operations. Next time specify ADAMAS standard tools—and be positive of getting ADAMAS, the work-proved, job-engineered carbide. None finer in the world!

Write for your new Adamas Carbide Tool Catalog AT53-B

ADAMAS
TUNGSTEN CARBIDE

ADAMAS CARBIDE CORPORATION • HARRISON, NEW JERSEY

impossibility if the majority of workers do not have these qualities.

A movie critic once said: "The happy ending in some films is the simple fact that the picture has ended." So it is with the problem of dealing with the disruptive, chronic know-it-all. The happy ending, from the standpoint of the department's efficiency, will result from the ending of the offender's services.

"The bigger a man's head gets, the easier it is to fill his shoes." Exaggerated superiority can affect a man's capabilities to the extent that it would be more profitable to get rid of him and train another worker for his job. Peace in the shop family would more than offset the temporary annoyance of breaking in a substitute. The net result would be that the rest of the men would work harder once the source of their complaints was removed.

What can the foreman do about the established know-it-all? Before resorting to discharge to end the disruption of peace in the shop, he should give the hotshot fathead a "cathartic" interview. After the foreman's admonition and advice regarding the worker's habits, he should get the man's reaction to this toned-down bawling-out. Such an interview encourages the employee to blow off steam and, in confidence, criticize whatever and whomever he wishes. The worker, given the opportunity, and an attentive listener, may in the course of his discourse give the foreman insight into what leads him to act the way he does. It is not suggested that the foreman assume the role of psychologist, and that the worker be permitted to ramble on in a true confession of the story of his life. But a discussion by the foreman and the worker on how to win good will and avoid offending or disturbing his fellow workers may obviate the necessity for taking more drastic steps to solve the troublesome problem.

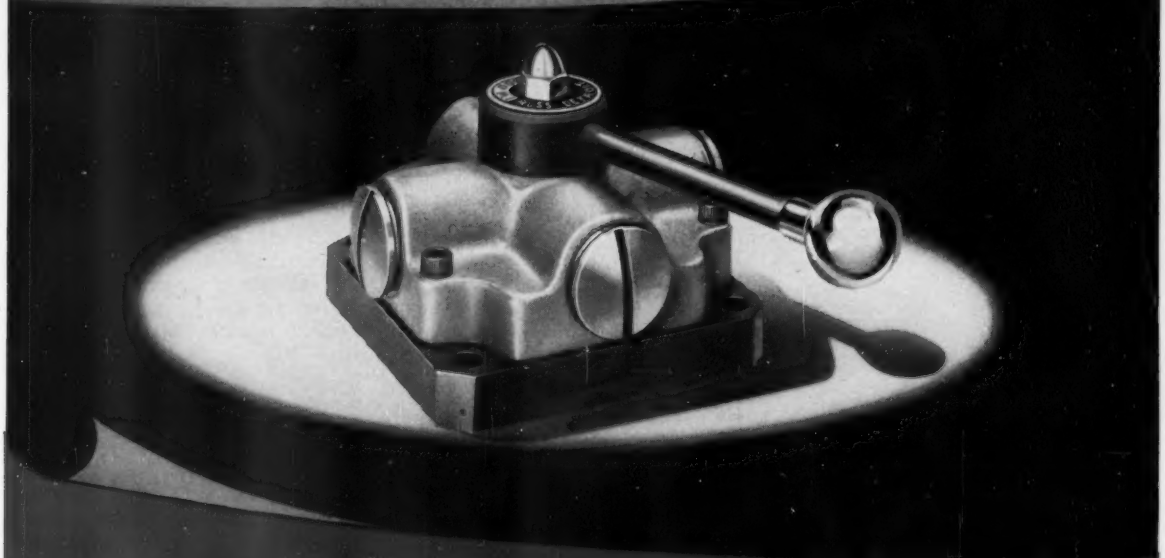
Although the hotshot fathead pre-

"Well, I guess we've all gotta go some day."

IT'S NEW . . .

IT'S FOR MACHINE TOOLS . . .

it's a "pancake"—2" high



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- Seals with air pressure
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- A 4-way unit available in ¼ and ⅜-inch pipe sizes

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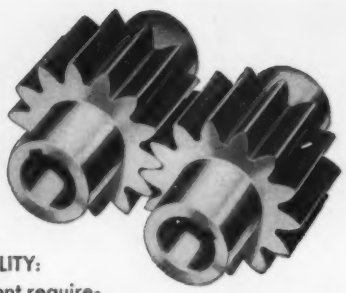

In gears, HQ stands for HIGH QUALITY:
HQ gears must meet the most stringent requirements, must do the toughest jobs efficiently. And for the best in custom-made HQ gears — *where quality really counts* — many smart gear buyers rely on The Cincinnati Gear Company. Each gear is individually made to meet specific requirements, produced to exacting standards, and backed by Cincinnati Gear's reputation for producing only good gears. If your next job demands HQ custom gears, write, wire or call today for further information.

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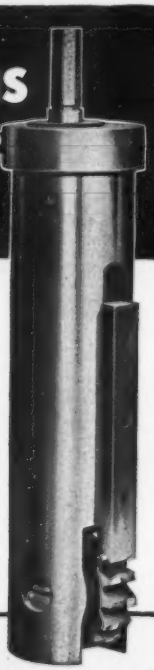
10 Good Reasons
why YOU should use NATIONAL Keyseating Millers on your next job



They will mill keyseats:

- in one cut.
- in offset holes.
- that are straight.
- with parallel sides.
- partly through holes.
- for interchangeable parts.
- without clamping the work.
- of standard width and depth.
- in holes that are closed at one end.
- where keyseating machine can't reach.

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complete, handy size

sents an uncommon disciplinary problem, nevertheless it should be handled as other and more common infractions of industrial discipline. Discipline is primarily a matter of self-control rather than punishment and, in the relations between management and workers, the punitive aspects are best subordinated to voluntary and willing participation in an enterprise requiring the cooperative efforts of all. Even though some sort of action appears necessary to maintain discipline and morale, it is wise to proceed slowly until the whole matter has been thoroughly analyzed to find out the true nature of the problem. Thereafter, the proper action is usually fair and clear, and should be taken promptly and firmly. Neither management nor employees gain from hasty, ill-considered disciplinary action based on incomplete knowledge and understanding of a situation.

If the man is too firmly set in bad habits to ever change, and his subsequent actions bear out this condition, the only alternative is justified discharge. His bad habits may be the result of personal maladjustments developed after engagement, or they may have been traits of the individual before hiring. Studies show, with monotonous regularity, that personal characteristics are the basis for some 90% of discharges; this fact serves to emphasize the necessity for the exercise of greater care in selecting candidates for employment in order to minimize the hiring of people who will only have to be discharged later.

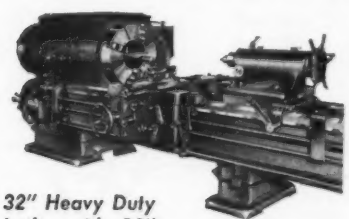
I do not agree with Ed's objection to having the personnel department take some responsibility for discharge, or for another solution of the problem of the hotshot fathead. The old days of arbitrary and final

The First Lehmann HYDRATROL Lathe Ever Sold is Still Going Strong!

18 Years of Grueling Service for Lathe #5155

Here is dramatic proof of the durability and rugged dependability of Lehmann HYDRATROL Lathes! The first Lehmann HYDRATROL, sold over 18 years ago, is still operating every day. The present owner of this Lathe, A. J. Flowers of the W. L. Flowers Machine and Welding Co., Alice, Texas, recently wrote us:

"We are happy to say we are still operating the Lehmann Lathe Serial No. 5155. We have averaged operating the lathe sixteen hours each day. It is giving excellent service."



32" Heavy Duty Lathe with 13" Hole in Spindle

FIVE SIZES—18" to 36"

Small	**18" up to**	**7½" Hole**
Medium	**25" up to**	**12" Hole**
Large	**32" up to**	**13" Hole**
Large	**36" up to**	**16½" Hole**

(Standard type lathes, 16" to 36")

Remember these important HYDRATROL features:

• 16 spindle speed changes with only a "Twist of the Wrist" • Automatic slide rule co-ordinated with movement of handle shows spindle revolutions per minute and indicates cutting speeds in feet per minute • 16 forward and 8 reverse speeds • No need for intermediate stop; unnecessary to disengage the friction driving clutch to change speed • Hydraulic friction clutches and hydraulic brakes, self compensating • Automatic safety relay for harmless and easy engagement of positive clutches when speeds are changed • Spindle release for chucking • Safety-control lubrication with filtered oil • Gears constantly in mesh • Safe in operation • Simple construction and operation.

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MOUNTINGS

When you mount machinery the modern UNISORB way, you . . .

- SAVE 10% to 20% on installation time and labor
- ELIMINATE damage due to floor drilling
- REDUCE transmitted machine vibration by 60% to 85%
- INCREASE the operating efficiency of your machines and men

For proof of these advantages and what they can mean to you, return the coupon for a copy of the UNISORB Book. We will be glad to mail you a free copy.

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discharge by foremen are gone forever in most organizations. He can, however, recommend that an employee be dropped from the payroll, and should have his case fully documented before presenting it to his own supervisor for approval. It is in aiding this review that the personnel department can make a significant contribution. Many of the records covering an individual employee, which often reveal the reasons why he has acted as he did, are in personnel's possession, and, among other things, the possibility of transfer in lieu of separation can best be explored by them.

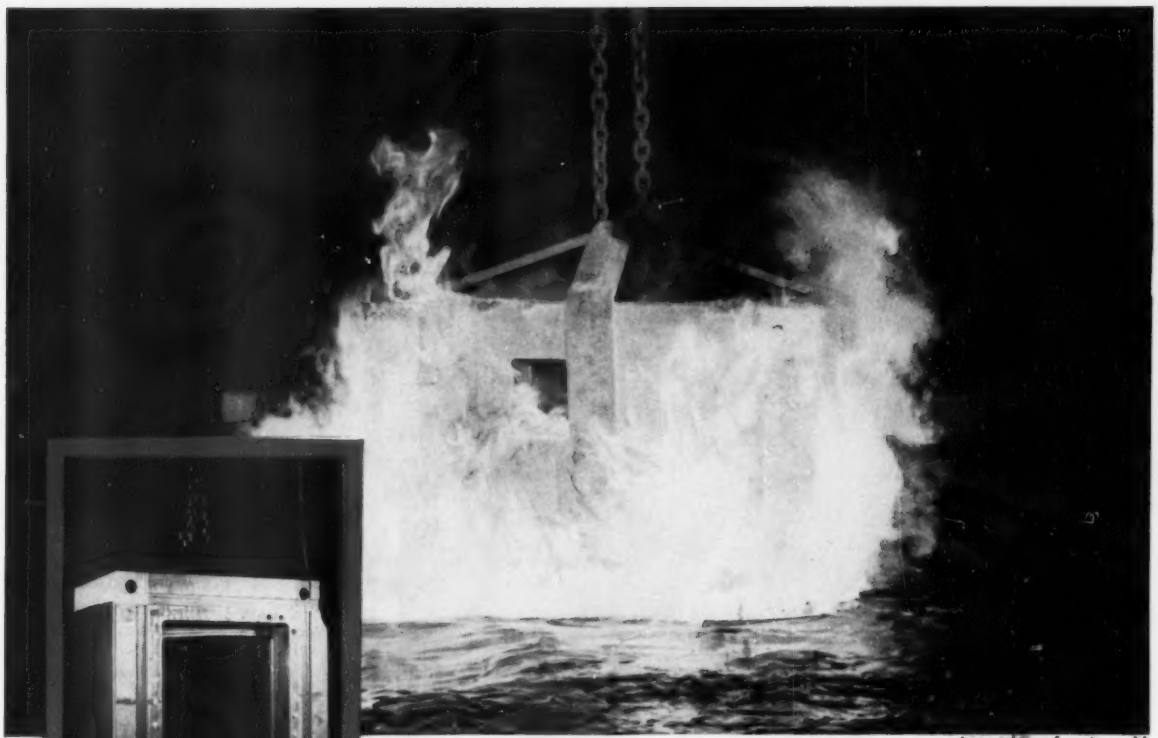
One of the pleasantest co-workers I ever had the good fortune to know was that way because he had occasional flashes of silence that made his conversation perfectly delightful. No knowledge we ever acquire is so important as a knowledge of what to say and how to say it, of what to do and how to do it. It is the secret of success, and gives ease and poise to an individual that no amount of learning can give. Quietness and thoughtfulness in speech and act are the signs of a mature mind.

"The mouth of a wise man is in his heart; the heart of a fool is in his mouth, for what he knows, or thinks, he utters." Many people talk, not because they have anything to say, but for mere love of talking. Talking should be an exercise of the brain, rather than of the tongue.

What the hotshot fathead needs is less public speaking and more private thinking. There are too many fatheads who think they can push themselves forward by patting themselves on the back.

Harry Kaufman
Philadelphia, Pa

"Huskier pay this week, Charlie — we're using a heavier paper envelope!"



..oil quenching of cavity mold

LINDBERG STEEL TREATING HELPS MAKE BETTER TELEVISION CABINETS

Plants in

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On Chicago's west side, one of the largest sets of plastic molds in the world is producing 21" Motorola television cabinets at a rate of more than one every five minutes.

These molds, designed by Chicago Molded Products Company in cooperation with Motorola, and heat treated by Lindberg Steel Treating Company, weigh more than five tons . . outside dimensions are 40" x 43" x 36" . . and they're worth $75,000 a pair!

The production of such a set of molds is a perfect example of team-work by American industry. Crucible Steel Company poured the ingots, and pressed them into huge blocks each weighing 13,900 pounds. The R. O. Schulz plant in Elmwood Park, Illinois, did the machining and polishing.

Next, came the heat treating . . the finished molds had to be treated to precisely the right hardness . . for they had to withstand the washing of plastic materials . . and they had to be tough enough to stand up under the terrific pressure of the 1500 ton compression molding press.

At this point Lindberg metallurgists and heat treaters went into action. There could be no trial runs . . no mistakes, or $75,000 worth of molds quickly could become $600 worth of scrap metal.

Heat treating specialists selected the proper furnace, specified the correct heating temperature, the necessary time at heat, the right procedure for quenching. "Operation Motorola" went off without the slightest hitch. Within hours after tempering, the molds received final surface polishing . . in a matter of days they were forming cabinets for Motorola TV sets.

Lindberg Steel Treating Co., and its large staff of metallurgists and heat treaters are available to consult on *your* heat treating requirements . . whether your problem is simple or "almost impossible."

A case history of Lindberg Steel Treating Co. service to American industry

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Push or *Pull*

. . . and no matter which way you operate your broaching *machine* . . . it is still the *broach* that does the cutting.

When you entrust the accuracy of your broach to "Connecticut," and to "Durakeen," you obtain the degree of accuracy that pre-determines the quality and interchangeability of the broached parts. When finished with a Durakeen broach, the first and one-thousandth part are identical.

No one can give you better high-speed steel than Durakeen . . . and we have many loyal customers who feel the same way about the high quality of Connecticut broach design and production engineering.

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DURABILITY WITH KEENNESS

THE CONNECTICUT BROACH AND MACHINE COMPANY

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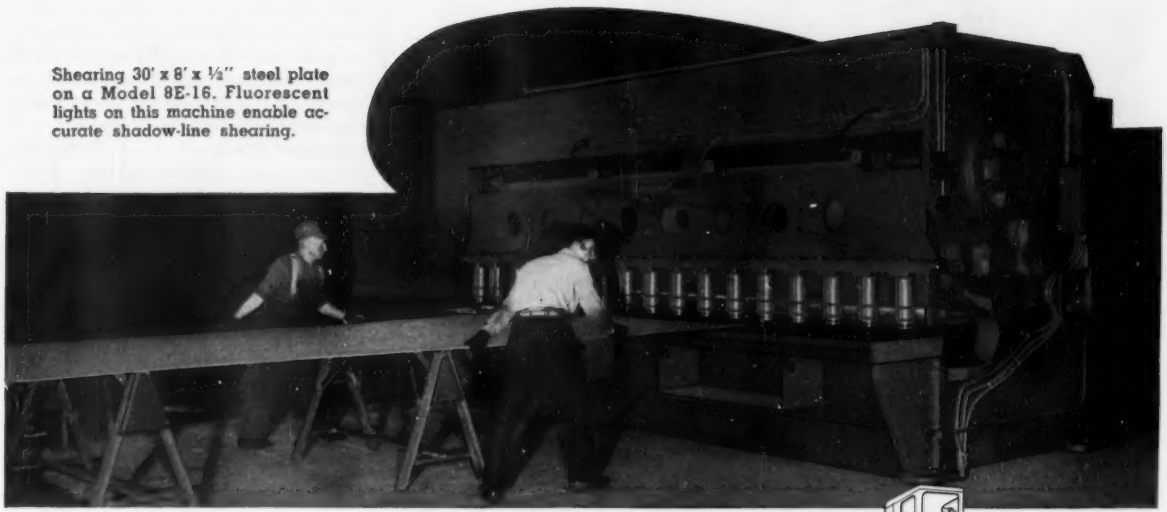
REPRESENTATIVES AND DISTRIBUTORS

Shear-Speed Chemical Products Div of the Michigan Tool Co of Detroit has named a number of production engineers to represent the division, which has introduced a new universal coolant - lubricant, Shear-Speed soluble oil. **R W Glahn,** 213 Meadow Rd, Syracuse 4, NY, has been named to cover central New York state; **A F Olson,** 130 Maynard Drive, Buffalo 21, New York—western New York state, and Erie, Warren, McKean, Potter, and Tioga counties in Pennsylvania; **L D Supply Co,** 117 W Latimer St, Tulsa, Okla, and 436 Maple St, Wichita, Kans—Kansas and Oklahoma; **E J Maddock,** 207 Investment Bldg, 239 Fourth Ave, Pittsburgh 22, Pa—western Maryland and adjacent Ohio counties, western Pennsylvania and northern West Virginia; **T S Mellen,** 601 Tower Bldg, South Bend 1, Ind—northern Indiana and adjacent Michigan counties; **Vincent L Kennedy,** 754 Woodlawn, Jackson, Mich—northwestern Ohio and Hillsdale, Lenawee and Monroe counties in Michigan; **J R Armstrong,** 919 Fletcher Trust Bldg, Indianapolis, Ind—central and southern Indiana, excluding Madison and Delaware counties; **Colonial Tool Co,** Box 289, Walkerville Post Station, Windsor, Ontario—Canada; **Moen Sales & Engrg Co, Clarence H Moen,** 417 Metropolitan Bldg, 430 North Saginaw St, Flint 3, Mich—lower peninsula of Michigan, excluding Detroit area, and Indiana border counties; **Pierce & Rodman,** 640 Penton Bldg, Cleveland 13, Ohio—northeastern, Ohio.

Abrasive & Supply Co, 15443 Woodrow Wilson Ave, Detroit—for **Morse Chain Co's** Detroit area distribution of mechanical power transmission products, including the Hy-Vo high-speed chain drive, and an adjustable slip-clutch for motor drives.

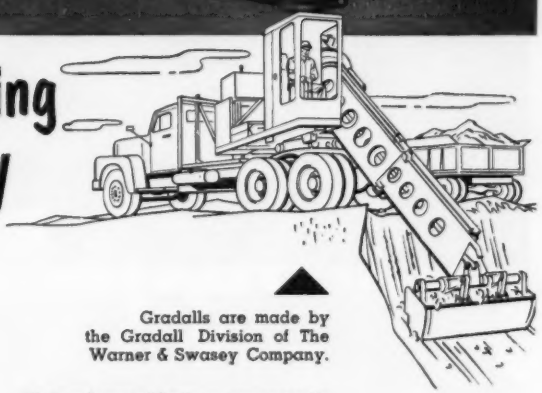
Henry Walke Co, Norfolk, Va, and Charlotte, W Va — for **General Electric Co's Carboloy Dept** distribution of entire line of standard cemented carbide tools and blanks, carbide-tipped masonry drills, and diamond wheel dressers.

Dorman Tool Co — for **Thriftmaster Products Corp's** line of drillheads, tapping attachments, and allied tools in the New York and New Jersey metropolitan areas.



Shearing 30' x 8' x ½" steel plate on a Model 8E-16. Fluorescent lights on this machine enable accurate shadow-line shearing.

Smooth, Accurate Shearing Aids Warner & Swasey Gradall Production



Gradalls are made by the Gradall Division of The Warner & Swasey Company.

A Steelweld Pivoted-Blade Shear cuts all the plate used in the manufacture of Warner & Swasey's Gradall Multi-Purpose Earth-Moving Machines.

Because of the simple Micro-Set knife clearance adjustment it produces clean, sharp cuts to close tolerances in various thickness metals ranging from light gauge to ½".

The motor-driven back gauge is very popular with the operators because of the ease and speed with which it can be set. Simply by pushing buttons at the middle front of the machine and reading a dial which records to 1/64 inch, the gauge is quickly positioned exactly as required.

Steelweld Shears and Gradalls are alike in many respects: Heavy all-welded construction — Many new and revolutionary features — Entirely different in operating principle from other similar-purpose machines. Both speed the work and cut costs.

If you work with metal plate of any kind, you should have the facts on Steelweld Shears. A Steelweld representative will be glad to call on you at your convenience.

Dial and control buttons conveniently located at middle front of shear for setting motor-driven back gauge.

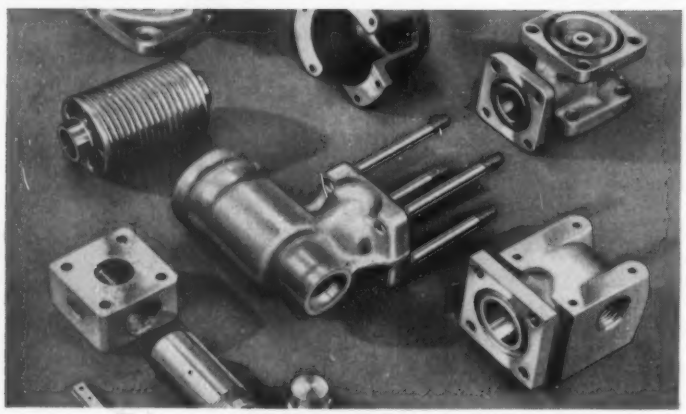
GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

1436 EAST 282 STREET *WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE SHEARS



Industry depends upon the special skill of overhead linemen to keep the "hot" wires carrying power to turn the wheels. Many product manufacturers depend upon the special skills of Vinco production personnel to supply component parts. Because these parts are supplied at competitive costs and with a very minimum of scrap, they create an added profit for the customer.

All tools and gages used for mass producing component parts from ferrous or non-ferrous metals are designed and made to Vinco high standards in its tool and gage plant.

Let Vinco specialists prove that they are your best bet!

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Gear Pumps • Master Gears • Commercial Gears
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Precisiondex • Gear Rolling Inspection Fixtures ®

TRADEMARK OF DEPENDABILITY

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MILLIONTHS OF AN INCH FOR SALE

M E Neprash Co, Cedar Rapids, Iowa, has been appointed sales representative for the **Charles William Doepke Co** of Rossmoyne, Ohio, manufacturers of NesTier small parts material handling system. Neprash will represent the firm in Iowa, Nebraska, and southern South Dakota. Additionally appointed are: **Nook & O'Neill,** Cleveland, Ohio, and **Material Handlers,** Charlotte, NC.

Scully-Jones & Co, Chicago, has named the following to handle its precision holding tools: **E A Kinsey Co,** 725 North Capitol Ave, Indianapolis 4, Ind; **J M Tull Metal & Supply Co,** 285 Marietta St, NW, Atlanta, Ga; **E A Kinsey Co,** 1020 W 5th Ave, Columbus, Ohio, and 331-335 West 4th St, Cincinnati, Ohio; **Production Tool & Supply Co,** 2830-32 Easton Ave, St Louis, Mo; **Rickert Industrial Supply Co,** 612 W Michigan St, Milwaukee, Wis; **Walter R Hammond Co,** 1419 Washington Ave, S, Minneapolis, Minn; **Precision Tool Sales,** 101 W Archer, Tulsa, Oklahoma; and **Eichman Machinery Co,** 1701-3 Locust St, Kansas City, Mo.

Tay-Holbrook, 165 Eighth St, San Francisco—for **Chrysler Airtemp's** line of air conditioning, heating, and refrigeration equipment in northern California and northern Nevada. Distribution centers include branches in Oakland, Berkeley, Santa Rosa, San Carlos, San Jose, Salinas, Bakersfield, Fresno, Stockton, Sacramento, Eureka, and Reno.

Poe Co, Detroit, Mich—for **Worthington Corp's** line of vertical turbine pumps.

A J Rod Co, Houston, Texas — for **Kurt Orban Co's** line of German-made machine tools in Houston and southern Texas.

"Ultrasonic . . . titanium . . . laminated . . . I been away too long Joe . . . half the time I don't know what these youngsters are talking about."

La Grand Industrial Supply Co, 15 S W Arthur St, Portland 1, Ore; **The Sidney B Roby Co,** 208-214 South Ave, Rochester, NY; and **Fehrs Tractor & Equipment Co,** 1809-11 Cuming St, Omaha 2, Nebr—for **Reed Roller Bit Co's** (Houston, Texas), Cleco and Dallett lines of air tools and accessories, including tools for construction, manufacturing, metal fabrication, foundries, and industrial maintenance.

William R Frey, Room 420, Beason Bldg, 25 East 2nd St South, Salt Lake City, Utah, and of 1219 California St, Denver Colo, has been named representative in Denver for **Protective Coatings** of Tampa, Fla, and Cleveland, Ohio. Mr Frey will handle New Mexico, Colorado, Utah, Montana, Idaho, and Wyoming.

Cullman Huber has been appointed factory representative for **Atlas Chain & Mfg Co** in the greater New York marketing area, including northern New Jersey, eastern Pennsylvania, western Maryland, and the provinces of Quebec and Ontario, Canada.

Industrial Products Sales, Inc, has been appointed to handle sales for **Alloy Precision Castings Co,** Cleveland, in the states of Ohio and Michigan. Company headquarters are at 227 W Exchange St, Akron. Branch offices are maintained at 238 W Lafayette St, Dayton, and in the Fisher Bldg, Detroit.

US Steel Supply Div, US Steel Corp, Chicago—for **A O Smith Corp's** welding products in the West Coast area. Facilities exist at Los Angeles, San Francisco, and Portland, Ore.

Crunkleton Co, 5324 McCorkle, S E, Charleston, W Va—for **Clark Equipment Co's** entire line of materials handling equipment, covering parts of Ohio, West Virginia, and Kentucky.

Transmission Equipment Co, 527 Lexington Ave, New York, have been named sales representative throughout the US and Canada, with the exception of New England, for **Acme Welding,** division of The United Tool & Die Co, West Hartford, Conn.

Reciputi & Weiss, Inc, 25 John St, Amityville, LI, NY, has been named eastern representative for **Gladden Products Corp,** Glendale, Calif, manufacturers of aircraft hydraulics, pneumatics, and fuel systems. The New York firm will act as liaison and application engineers in the territory.

Here are the points...
Jaws Nickel Chrome Moly Alloy Steel
Key Holes: do not extend into body cavity thereby sealing out dirt
One Piece Geared Nut Construction
Entire Chuck Body Hardened inside and out
Taper Bore hardened and ground
Chucks and Keys interchangeable with other makes
...that make
Quality
Supreme
BRAND
Chucks
Every chuck is individually checked for accuracy . . . you can depend on Supreme Chucks for trouble-free performance and long wear.
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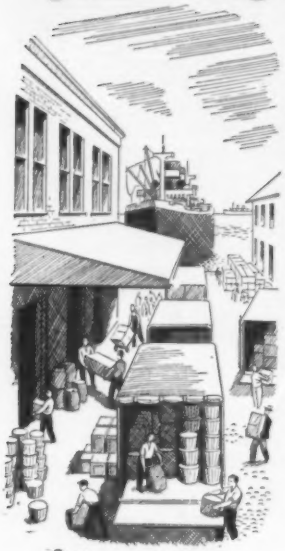
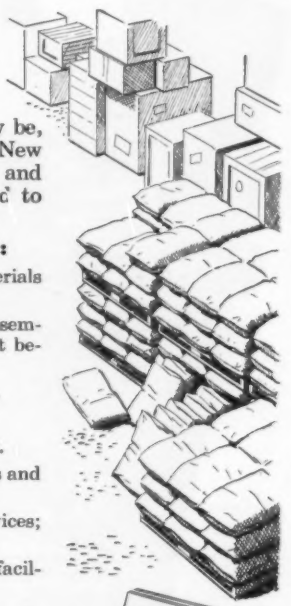
SUPREME PRODUCTS, INC.
2222 S. CALUMET AVE., CHICAGO, ILLINOIS
the chuck that lives up to its name . . . SUPREME

Markets were this plant's big location problem . . .



A manufacturer of gears and clutch assemblies wanted to locate a new plant in the high-income northeast area, as near as possible to his best potential markets. He took his problem to the Industrial Location Service of the State of New York. Within a short time he had complete, confidential data which enabled him to determine the most concentrated markets, and to select the most efficient location from which to reach them.

What's yours?



No matter what your location problems may be, the Industrial Location Service of the State of New York will be glad to get you, confidentially and without obligation, the information you need to solve them.

YOU CAN GET AUTHORITATIVE DATA ON:

Raw Materials: Cost and availability of all materials and supplies you may need.

Transportation: Availability of facilities, cost of assembling materials and distributing finished product between any given points.

Markets: Industrial and consumer market data.

Labor: Availability, skills and rates.

Power and Fuel: Character and cost at any point.

Available Buildings: Types, condition, facilities and terms. Confidential.

Sites: Availability, size, character, installed services; photos and maps. Confidential.

Community Services: A complete report on the facilities and attitudes of any community.

Laws and Regulations: Full data on laws or regulations applying to any particular form of enterprise.

FREE BROCHURE AND MAP. Send for "Industrial Location Services," a full description of the valuable, detailed plant location information New York State will obtain for you. 1954 large-scale physical map of the state and adjacent areas, showing elevations, transportation systems, watersheds, etc., will also be sent. Write New York State Department of Commerce, Room 813, 112 State Street, Albany 7, New York.

Industrial Location Service of
New York State

"WE DON'T SELL SITES—WE MATCH NEEDS"

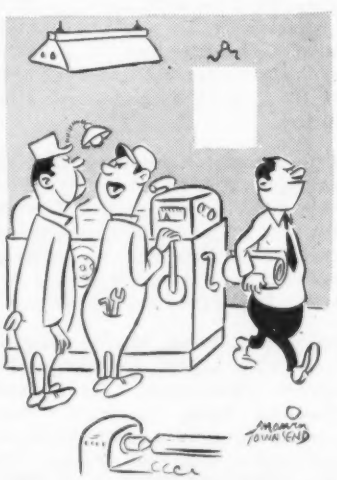
J Schlank Co, Harrison, NJ, and **Allied Equipment & Supply Co,** Bayonne, NJ—for **Cleco Pneumatic Tool Div of Reed Roller Bit Co,** Houston, Tex, to handle air tools and related products. **Matermaco-Congo,** dealer in construction materials with headquarters at Elizabethville, Belgian Congo, will distribute Cleco products in that section of Africa.

Robert W O'Neal has joined the **Rees Machinery Co,** Pittsburgh, as a sales engineer. Mr O'Neal was associated with US Steel Corp in the Chicago and Pittsburgh districts from 1933 to 1943, and with the Follansbee Steel Corp, where he was chief industrial engineer.

C B Hunt & Son, Salem, Ohio, manufacturers of Quick-As-Wink air and hydraulic control valves, has appointed **Alfred Halliday** representative for Kentucky, central and western Tennessee, northern Mississippi, and Arkansas. Offices are at 317 Starks Bldg, Louisville, Ky; 1509 Madison Ave, Memphis, Tenn; 916-½ Henley Ave, Knoxville, Tenn.

Beverly D Smith Co, 29 N Dean St, Englewood, NJ, has been appointed sales representative for **S-P Mfg Corp** of Cleveland, Ohio, makers of power chucks, air, and hydraulic cylinders. The representative will cover Manhattan, Long Island, and southern New York state as far as Orange and Putnam counties.

M Gurvey, Wilmond Co, Plastics Div, 2488 Dufferin St, Toronto, has been appointed Canadian representative to handle the complete line of regular vacuum and drape forming vacuum machines manufactured by **Auto-Vac Co,** Fairfield, Conn.



"That's stupid! How could a little ol' calendar distract us from our work? I think he's got a grudge against Marilyn Monroe."

GET EXTRA TAPPING CAPACITY AT *LOW COST*

- Fits the drill press spindle just like any other shank tool. No alterations necessary.
- Super-sensitive friction clutch provides full protection against tap breakage and work spoilage.
- Quill clamps are available for absolute rigidity.
- Made in 7 sizes for 0 to 1" taps.

SUPPORT YOUR LOCAL ETTCO-EMRICK DISTRIBUTOR

He offers you:

- A sales and service force ready to give you on-the-spot assistance at all times.
- Ample stocks — quick deliveries — authoritative information on Ettco-Emrick equipment.
- Expert advice in selecting the right equipment for your needs.
- A personal interest in your problems — he knows that *his* success depends on *your* satisfaction.
- An opportunity to foster your own public relations by supporting a local business which has a vital stake in your community.

Call him today — he's only as far as your telephone.

For Full Details Write For Bulletin No. 22

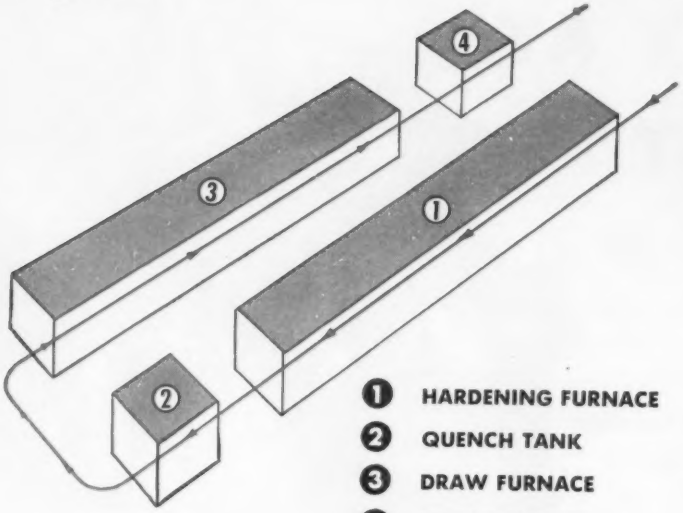
Ettco-Emrick TAPPING ATTACHMENTS

ETTCO TOOL CO., INC.
590 Johnson Ave., Brooklyn 37, N. Y.

DETROIT • CHICAGO • WORCESTER • SAN GABRIEL, CALIF. • Dealers throughout the United States and Canada

Heat Treat Furnace Layout

by *Holcroft* ...4th of a Series



Automatic Heat Treating Speeds Forging Production

Holcroft developed this automatic furnace unit in order to heat, quench and temper automotive crankshaft forgings.

It consists of a gas-fired hardening furnace, a quench tank, a draw furnace and a cooling tank. So automatic is the production, that a two-man team can handle the entire operation. As a result, the unit contributes materially to trimming production time to a third or even a half of that required by previous methods.

Now, it's entirely possible that this unit costs a little more to install. BUT—a close examination of the cost records indicate savings after savings after savings. Just simple arithmetic proves the economy of a "little more costly" Holcroft furnace. Write today for details. Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Michigan.

BUILT BY HOLCROFT & COMPANY DETROIT-MICH

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO 9 — J. H. Bradley, A. A. Engelhardt, 4209 South Western Blvd.
CLEVELAND 15 — Wallace F. Schatt, 1900 Euclid Ave.
HOUSTON 1 — R. E. McArdle, 5724 Navigation Blvd.
CANADA — Walker Metal Products, Ltd., Windsor, Ontario
EUROPE — S. O. F. I. M., Paris 8, France

Giebel, Inc, 250 W 57th St, New York, has been appointed sales representative for the line of machine tools made by the **Hanson-Whitney Div, Whitney Chain Co.** Giebel represents the company in Connecticut, New Jersey, and eastern New York; a branch office is located at 152 Temple St, New Haven.

Pioneer Salt Co, Philadelphia, Pa, has been appointed sales agents in eastern Pennsylvania and south Jersey for the solvent products of the **John B Moore Corp,** Nutley, NJ. **Donner & Co** of Winnipeg, Manitoba, has been appointed to handle western Canadian sales.

Basco Mfg Co, Stamford, Conn, has appointed the following manufacturer's representatives to handle sales of Basco separators throughout the country: **Charles Koslowsky Co,** 818 Porter Bldg, 406 W 34th St, Kansas City 2, Mo, to cover Iowa, Missouri, Kansas, and Nebraska; **Francis Hughes & Associates,** 926 University Tower, Montreal 3, Quebec, to cover Canadian teritory; **John R Whitney & Co,** 10 High St, Boston 10, Mass, to cover all of New England, except southwest Connecticut; **Brown & Stuart Co,** 3 Woodside Ave, Stamford, to cover southwest Connecticut; **Robert F Evans & Sons,** 5107 Charlynne Lane, Torrence, Calif, to cover California, Oregon, Washington, and Arizona; **Lyman B Warren Co,** Corner Bradford & Wycliff Sts, St Paul, Minn, to cover Minnesota, North and South Dakota, western half of Wisconsin; **The McLohne Co,** PO Box 437, Rockford, Ill, to cover Illinois. Appointed as distributors to handle marketing of the company's line of Basco sheet steel separators are: **Schlank-Savage Co,** 38-40 S Sixth St, Harrison, NJ; **Clark Hopkins Equipment Co,** Ridge Ave & Garden Sts, Philadelphia; **A G Cardineau & Co,** 700 Northumberland Rd, W Englewood, NJ; **J W Jackson Co,** 11309 Olney Ct, Cleveland 5, Ohio.

Phillip D Freeman has been assigned as sales representative to the St Paul, Minn, office of the **Trane Co,** manufacturer of air conditioning, heating, and ventilating equipment. **Richard E Jameson** has joined the Des Moines, Iowa sales office; and **Dennis W Nelson** has been appointed to the Billings, Mont, office.

George L Fix Co, Dallas, Texas—for **Warner Electric Brake & Clutch Co,** Beloit, Wis, industrial division's power transmission products, electric brakes and clutches for machinery of all kinds.

Announcing....

a New addition to our popular line of **SELECTIVE FEEDING DEVICES**

NOW! A FEEDING UNIT FOR ALMOST ANY SPECIFIC APPLICATION!

Also **EXTENDED ENGINEERING SERVICE—**

ENABLING US TO DO THE COMPLETE TOOLING FOR YOUR INDIVIDUAL FEEDING OPERATIONS

Now!

DPS BOWL-FEEDER

A proved method based on the VIBRATORY PRINCIPLE. Provides fully automatic, oriented, single line feeding to Grinding, Packaging, Inspecting and many other automatic machines and operations. Will scientifically feed light, fragile parts that normally could not withstand tumbling.

DPS BARREL-FEEDER

For years our popular unit, successfully used in thousands of plants to help speed production and reduce costs. They were designed with the idea of simplicity in operation and maximum feeding, handling a wide variety of parts. Designed for constant operation.

Write Us—Give Details and learn how our trained engineers can supply the answer to your feeding requirements.

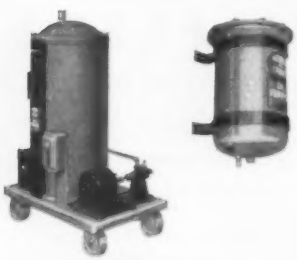
DETROIT POWER SCREWDRIVER CO.

2821-A W. FORT STREET, DETROIT 16, MICHIGAN

HONAN-CRANE OIL PURIFICATION

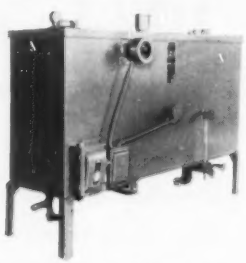
cuts hydraulic maintenance costs in half!

Stop downtime and costly repairs on hydraulic equipment before trouble has a chance to start! Honan-Crane oil purification keeps oil clear, clean and safe to use indefinitely . . . prevents excessive wear of pump parts . . . eliminates clogging and sticking of control valves, pistons and other vital mechanisms. Actually has effected (where no purification was practiced previously) 50% or more reduction in hydraulic maintenance costs, plus 4 to 5 times longer safe-use life of oil.



HONAN-CRANE HYDRAULIC OIL PURIFIERS

Available in many sizes for direct connection to individual machines, or as mobile units for general service. Ideal for complete, automatic removal of all abrasive contaminants and corrosive products of oxidation from oils used in presses, injection molding machines, etc.



HOUDAILLE DRI-PURE WATER-OIL SEPARATOR

New, versatile, compact unit removes moisture from vacuum pump oils . . . cuts pump-down time in half. Filters out contaminants as it separates water. Enables pump to provide a high vacuum without oil change—eliminates pump drying out maintenance.

Increase the efficiency of your hydraulic equipment . . . specify Honan-Crane Oil Purification. Write today for free 8-page Hydraulic Bulletin.

HONAN-CRANE CORP.
205 WABASH AVENUE, LEBANON, INDIANA
a subsidiary of
HOUDAILLE-HERSHEY CORPORATION

WORLD'S LEADING OIL FILTER MANUFACTURER

CURRENT BUSINESS

Douglas E McKey, former vice president of manufacturing of Burlington Mills, Burlington, Wis, has purchased the assets of **Nortmann-Duffke Co,** 2740 S 32nd St, Milwaukee, job metal perforators and manufacturers of perforated metal products. Business expansion plans are under way at the company, which will continue operations under its present name.

The Falk Corp, Milwaukee, has opened a new sales office in Dayton, Ohio, as a branch of the Cincinnati district office. **Howard H Nuernberg** has been appointed sales representative in the new office located at 410 West First St, under the supervision of District Manager K W Morrissey. The Midwest Fulton Co, which formerly represented Falk in the Dayton area, will continue as an authorized Falk coupling distributor.

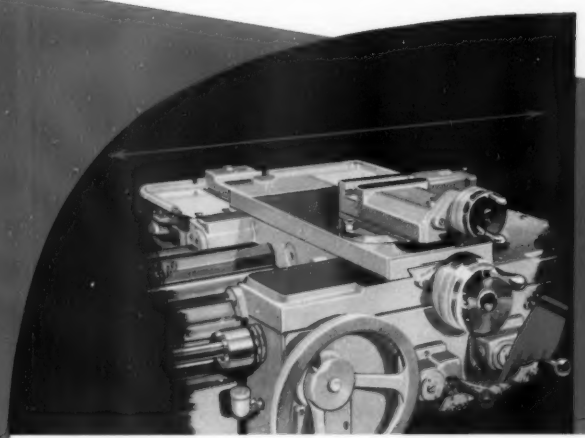
Harold C Schott & Associates of Cleveland has acquired a controlling interest in the **Sheldrick Manufacturing Co,** Upper Sandusky, Ohio, machine tool concern. Present plans call for expansion of the firm, but no broad changes in existing personnel.

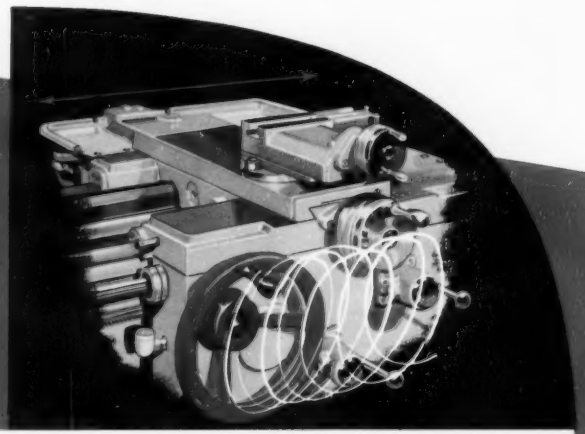
The 1954 **Metal Powder Show** and tenth annual meeting sponsored by the Metal Powder Association, 420 Lexington Ave, New York, will be held at the Drake Hotel, Chicago, April 26, 27, and 28.

The **Aerojet-General Corp** has announced plans for a $2.1 million expansion of its facilities near Sacramento, Calif. In addition to Sacramento, the company, a subsidiary of General Tire & Rubber, has operations in Azusa, Calif, and Cincinnati, Ohio. Expansion will be financed by the federal government to implement facilities to manufacture en-

"How about putting the drinking fountain on your 'things-that-need-attention' list!"

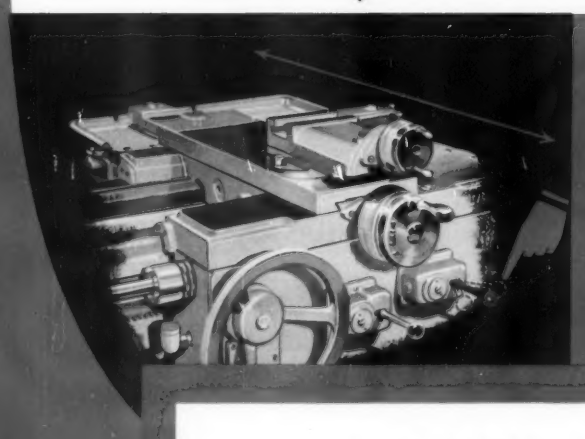
LOOK—NO APRON STRINGS
to tie lathe production down

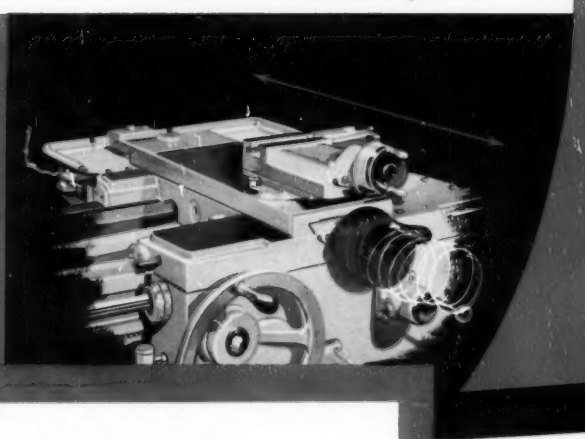




THIS!

NOT THIS!





CUT TOOL ADJUST TIME

50%

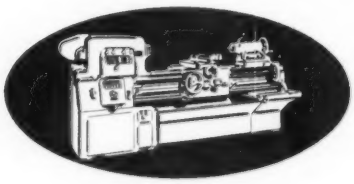
. . . Why tie Production down—when with just 2 Fingertip Apron Feed Levers, you can get Rapid Tool Positioning—Quick Tool Retraction—Fast Carriage Return—Improved Operating Ease—Greater Productivity.

SEE next 3 pages for details of the great new MONARCH Series 61 Lathes.

ANOTHER FIRST FROM MONARCH MACHINE TOOL COMPANY

FASTER PRODUCTION

The Great NEW Monarch Series 61 Lathe—with Fingertip 4-Way Power Rapid Traverse

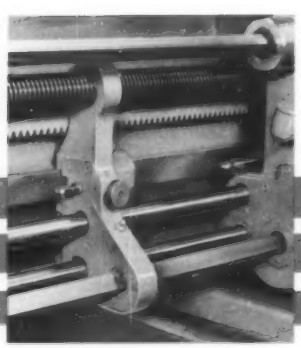


Here's a lathe to warm an operator's heart. And why not? He expends much less effort; yet produces more. The Series 61 is a machine he goes for . . . in a big way.

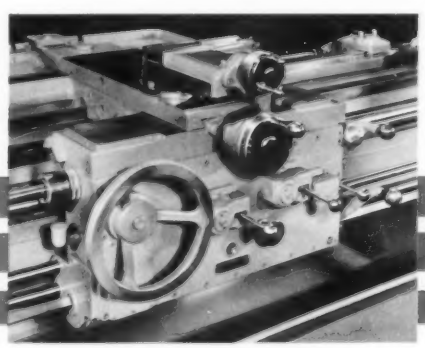
Monarch has scored another FIRST by putting *all* tool movements under power, right at the apron. This indeed is the control center of the machine. Close to it the operator spends 90 to 95% of his time. Nothing could be more logical than making it possible for him to do a better job easier at this critical position.

In addition to the Series 61 four-way power rapid traverse which slashes tool adjust time 50%, this machine includes such typical Monarch production features as **(1)** totally enclosed gear box and end gearing, **(2)** automatic pressure lubrication, **(3)** anti-friction bearings by the score, **(4)** ground or shaved helical gears in headstock, **(5)** American standard Camlock spindle nose, **(6)** flame hardened and precision ground integral bed ways and **(7)** all critical parts made of hardened alloy steel.

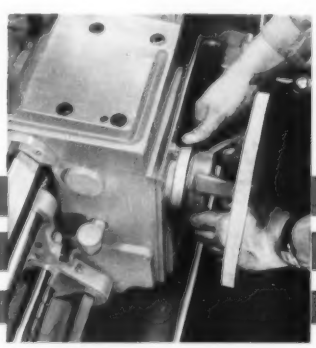
The foregoing numbered features are time-proved in the field, having won their spurs on other models of Monarch lathes. They are your guarantee that the Series 61 lathes are unequaled for accuracy, versatility and dependability. Want more information? Send the coupon (second page following) for our complete Series 61 Brochure #1124 . . . . . *The Monarch Machine Tool Company, Sidney, Ohio*



BRIGHT IDEA! Long bed Series 61 models boast these unique new traveling rod supports for leadscrew, feed rod, traverse rod and control rod. Without attention on part of operator, they're carried along—then re-positioned — as carriage travels.

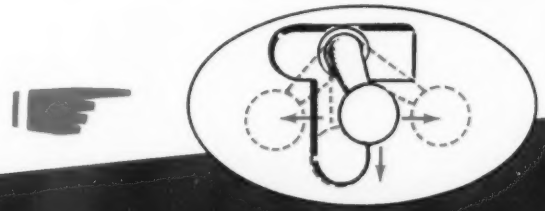


INSTANT, EASY CONTROL! Movement of longitudinal friction lever right or left actuates instant rapid traverse in direction of movement. Downward motion engages feed. Cross feed friction lever gives similar action to cross-slide. Quick —easy—a great time-saver.

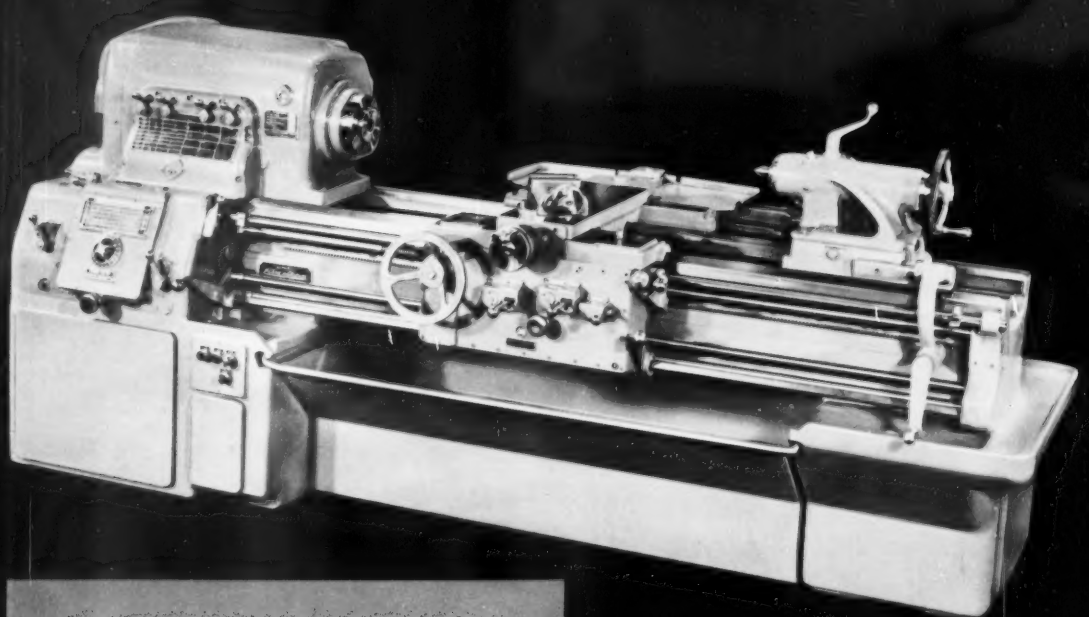


BUILT-IN DIRECT LENGTH READING DIAL! Usually furnished as an accessory at extra cost, the direct length reading dial is a built-in feature of the Series 61 and contributes to its accuracy and speed. This feature, used for multiple diameter turning or boring is especially valuable when boring blind holes.

EASIER OPERATION



CUTS TOOL ADJUST TIME **50%**



Monarch 16" Series 61 Lathe . . . representative of *the first and only complete line of lathes with inbuilt power rapid traverse.* Available in Engine and Toolmaker's Models — 13", 16", 20" and plus-swings in all three sizes.

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

FOR A GOOD TURN FASTER—TURN TO MONARCH

Continued on next page →

Continued from preceding page

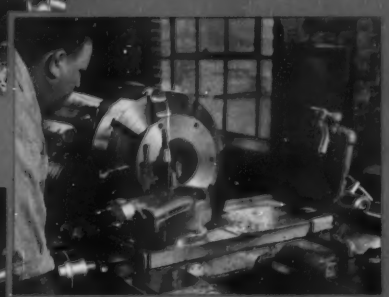
50% LESS TOOL ADJUST TIME

A BIG SAVINGS ON JOBS LIKE THESE

The more intricate the job, the more you save with the four-way power rapid traverse of the new Monarch Series 61 Lathes (see preceding pages). With a two-way longitudinal movement of 160″ per minute—and a two-way cross movement of 75″ per minute—you can see that the more tool adjust time needed for jobs on older lathes, the greater the savings on floor-to-floor time on the Series 61.

For further time-saving on both small lot runs and high production work, the Series 61 can be equipped with any one of 3 Monarch tracer controls—the Air-Gage Tracer, Monarch-Keller and Motor-Trace. Here's a machine with possibilities no lathe user can afford to ignore. Send coupon today for your copy of our Series 61 Brochure #1124.

TURNING



FACING

BORING

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

TOOLMAKER'S LATHES — 10″ to 20″

ENGINE LATHES — 10″ to 32″

THE MONA-MATIC
for high production metal turning

THE SPEEDI-MATIC
a fast, precision hand screw machine

THE MONARCH MOTOR-TRACE

THE MONARCH-KELLER TURNING MACHINE

THE MONARCH AIR-GAGE TRACER

THE MONARCH ROLL TURNING LATHES

THE SHAPEMASTER ENGRAVER

SPECIAL TURNING MACHINES

THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio

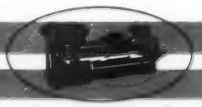
Gentlemen:
Please send me without obligation your complete illustrated Series 61 Brochure #1124

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



gines and boosters for pilotless craft, such as the Nike and the Regulus. Located on a 9000-acre site, the plant has been producing jet-assisted take-off rocket engines.

The **International Powder Metallurgy Co,** Ridgeway, Pa, manufacturers of oil-less bearings, will construct a branch plant in Colorado Springs, Colo, to effect savings on freight rates to its western customers. Most of the manufacturing equipment will be moved from the East to Colorado Springs; furnaces and gas generators will be built at the new site. **E G Smith,** superintendent of the Pennsylvania plant, has been named manager of the facility.

The **Tobey Manufacturing Corp,** El Segundo, Calif, producers of aluminum materials-handling equipment, has been purchased by **Magnesium Co of America,** East Chicago, Ind. The acquisition will be operated as the **Tobey Aluminum Div of MAGCOA,** with **Michael Neushul,** its founder and president, acting as vice president and division manager. The major product lines of both companies will be continued and enlarged.

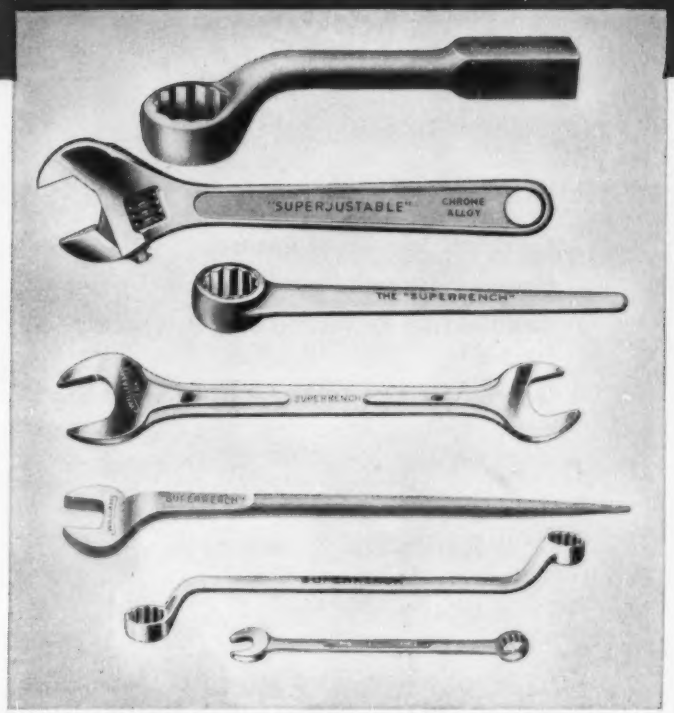
A new aluminum billet casting plant has been completed by **Michael Flynn Manufacturing Co,** Philadelphia. Production of the plant, with 13,000-sq-ft of floor space, will be available to metalworking industries; it supplements aluminum extrusion facilities which Flynn made available to industry after the war.

The Carborundum Co, Niagara Falls, NY, has acquired the capital stock of **American Tripoli Corp,** of Seneca, Mo, owners of deposits and a plant for production of Seneca Standard Tripoli, the unusual form of silica with many abrasive applications.

Allis-Chalmers Manufacturing Co has completed plans to enlarge manufacturing facilities at its Terre Haute, Ind, works. The additional 84,000-sq ft will permit manufacture of component parts for transformers, switchgear, and circuit breakers, the majority of which are presently subcontracted. Extensive tooling will account for the major part of a $4,250,000 expenditure for tools, equipment, and building. At full capacity the unit will provide work for 170 people; production in the new facility is expected to get underway by the end of the year.

American Meter Co of Philadelphia has acquired an industrial site of approximately 24 acres in Fullerton,

The RIGHT tools make the BIG difference



● See someone using a wrench with confidence and ease — getting maximum turning power in the most inaccessible spots — and chances are you'll find he's using a Williams "Superrench".

These wrenches are designed right — drop-forged from selected alloy steel — they're unbelievably strong, light in weight, well balanced. And, there is a wide range of patterns with openings from 3/16" to 3⅛".

So — if you have any idea that all wrenches are pretty much alike — try a Williams "Superrench" and feel the difference. Men who have worked with them already know. Just write for Catalog 302 detailing the new improvements and additions to the line... or ask your local distributor.

WILLIAMS
INDUSTRIAL TOOLS
"The Broadest Line of Its Kind"

PLUS local service from a Williams Distributor

J. H. WILLIAMS & CO. 406 Vulcan Street Buffalo 7, N. Y.

4 features that add up to 1 fact...

You can depend on JKS Diamond Tools

- Competent Selection of Diamonds
- Modern Plant with Modern Methods
- Qualified Field Representatives, Strategically Located
- Over 65 Years of Successful and Fair Dealing

Send for your copy of our Tool Catalog or perhaps you may wish to consult our engineering staff for assistance on *your* Diamond Tool problem.

2738

J. K. SMIT & SONS, INC.

Murray Hill, N. J.

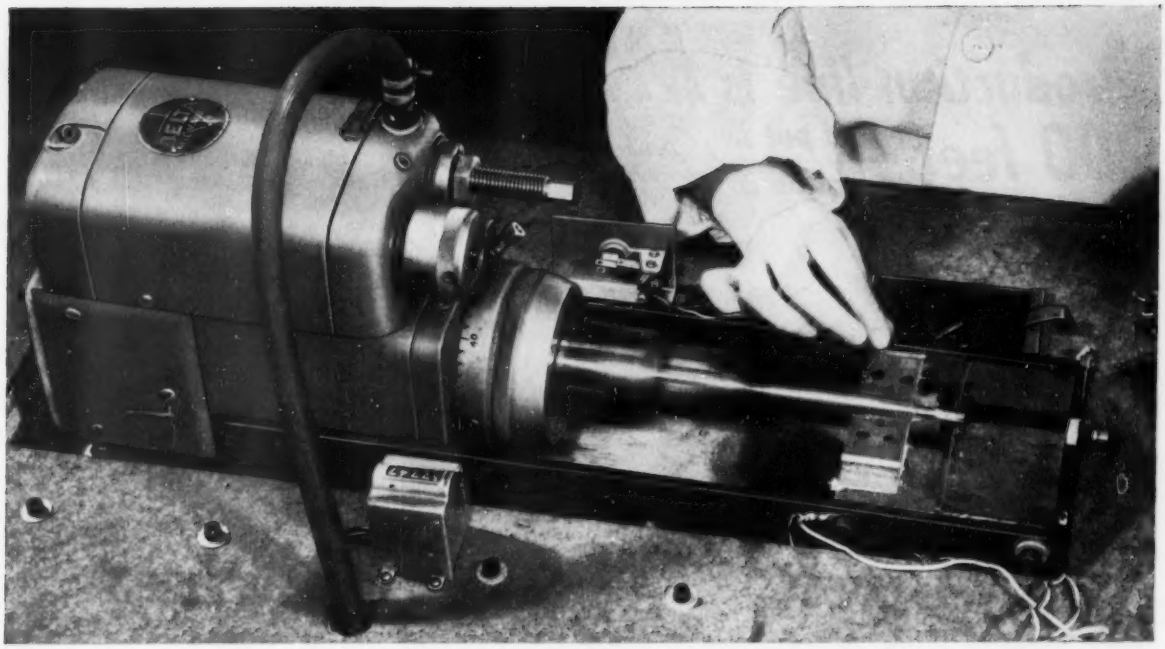
Calif, for the manufacture of gas meters, regulators, and instruments. The company, incorporated in 1836, has representatives in all major US cities.

Superior Tool & Die Corp has moved into a new $228,000 manufacturing plant in Glendale, Calif, containing over 36,000 sq ft of ground floor area and 5500 sq ft of second-floor future office space. Provisions for installation of the most modern materials handling equipment and facilities for flexible production lines is expected to increase production 25%. The company produces television chassis and components, and a large variety of pressed metal products for western manufacturers of automotive items, hardware, and appliances.

Cincinnati Cleaning & Finishing Machinery Co, manufacturer of cleaning, washing, paint finishing, and baking equipment, has acquired a new plant located at 2008 Hageman St, Sharonville, Ohio. The company operates two other plants in Ironton, Ohio, in addition to the new facility which contains offices, engineering and estimating functions and manufacturing facilities. The Sharonville works will concentrate on manufacture of specially designed finishing equipment; machines of standard design will be fabricated at Ironton.

ProToCorp, Inc, 751 Main St., Waltham, Mass, is a new industrial research and development firm founded by **Dr Edward Bentley,** former vice president and director of research and development at Instrument Development Laboratories. The company, consisting of former associates of Dr Bentley, has been formed to provide technical knowledge to solution of problems in instrumentation, subminiaturization, and many other fields of physics and engineering.

"Shop foreman said this machine was vibrating a little. You notice it?"



Rockwell* Air-Hydraulic DRILL UNIT

→ **SAVED $8,000 IN INITIAL COST!**
→ **SLASHED PART COST 40%!**
→ **CUT PRODUCTION TIME PER PART 79%!**

The Rockwell Air-Hydraulic Drill Unit made possible these very practical results for Radio Receptor Company, Inc., New York City producer of electronic devices. The problem involved the delicate precision assembly of tiny Germanium Diodes, which are rapidly replacing bulkier vacuum type radio tubes in circuits of television sets, electronic computers and radar equipment. Minute tungsten "cats whiskers" had to be "fine squeezed" into sensitive contact with a vertical germanium wafer—*with pressure controlled to tolerances of plus or minus .0002"!*

Very high rejects and slow manual production methods of this operation started alert manufacturing engineers searching for a better way to do it. Original estimates for equipment were in excess of $10,000 per machine—*and then Radio Receptor engineers investigated the Rockwell Drill Unit.*

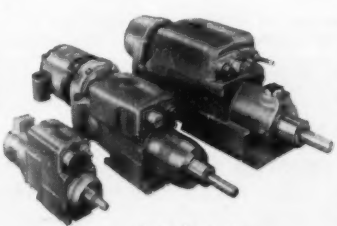
A single purpose machine—incorporating the Rockwell Air-Hydraulic Drill Unit—was devised for only $2,000, an immediate savings of $8,000! But even more important, production jumped from 2,000 to 10,000 units a day, with rejects cut almost to zero—*while cost-per-part was slashed 40%!*

This is just one example—in hundreds of production plants, Rockwell Air-Hydraulic Drill Units have cut costs by cutting waste time, motion and labor out of many varied operations. If you do production drilling, tapping, outside threading, chamfering, hollow milling, counter boring, reaming, centering, or spotfacing, *there is a real probability you, too, can make important savings through improved methods, using Rockwell Drill Units instead of conventional machine tools. Let our Authorized Sales Engineer in your area discuss possibilities with you. He not only offers you engineering counsel, but can also demonstrate right in your plant. Send the coupon today for his name.*

*Originally produced by Rockwell under the trade name "Delta."

Air-Hydraulic **DRILL UNITS**

Another Product by **Rockwell**



From ⅓ to 5 hp.

Drill Unit Division
Rockwell Manufacturing Company
618B N. Lexington Avenue, Pittsburgh 8, Penna.

☐ Please send name of nearest Authorized Sales Engineer.

☐ Please send me latest Drill Unit Catalog.

Name_____

Company_____ Title_____

Address_____

City_____ Zone____ State_____

Production line is MOVED 200 feet and put in operation in 23 minutes

Here's what happened...

IN A RECENT DEMONSTRATION

A production line of eight punch presses was moved to another location in a plant. The machines were set down, leveled, connected to air and electrical lines, and tools and dies inserted. All eight machines were producing parts in an elapsed time of 23 minutes. The new Leveling Barrymounts made this possible, because Barrymounted machines do not have to be shimmed and lagged to the floor. *The machines mounted on them will not walk.*

this *mobility* increases your profits because:

In contrast, another punch press was moved to the work area and positioned. It was then lagged to the floor and shimmed in the conventional manner. Total time, over 33 minutes for this one machine, compared to an average of *3 minutes per machine* when mounted on Barrymounts.

- Production lines can be quickly rearranged to improve work flow, or to meet product changes.
- Machines can be quickly moved to departments where they are needed.
- Machines can be quickly moved to central tool rooms for re-tooling or repair.
- Valuable floor space can be freed for production by moving idle machines out of the way.
- Inevitable mistakes in initial plant layout can easily be corrected.

Write TODAY for your free copy of "LOOK — NO LAGGING!" and learn what the new Leveling Barrymounts can mean in profits to YOU.

THE BARRY CORP.

703 PLEASANT ST., WATERTOWN 72, MASSACHUSETTS

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NAMES in the NEWS

William S Rheem II has been named general manager in charge of all domestic manufacturing and marketing activities of Rheem Mfg Co, Richmond, Calif. Mr Rheem, whose headquarters will be at the firm's Southgate, Calif, plant, succeeds **C V Coons,** transferred to the New York office, where he will be resident director.

Paul Mederich has been appointed manager of the Welding Products Div of A O Smith Corp's enlarged Elkhorn, Wis, plant, where all Smith welding machines are now made. He was formerly branch manager of the firm's Product Service Div at Chicago. **Ernst W Kiewitt,** named manufacturing superintendent at Elkhorn, has held various posts in the Automotive Div since 1926.

Charles B Sweatt has been elected to the newly-created post of vice president of the board of Minneapolis-Honeywell Regulator Co. He has been serving as executive vice president since 1945. Vice Presidents **Tom McDonald** and **A M Wilson** have been elected executive vice presidents. Mr McDonald has headed the firm's sales activities, and Mr Wilson, the Aeronautical Div.

Byron C Heacock, chairman of the executive committee of Caterpillar Tractor Co, has been appointed civilian chief of the San Francisco Ordnance District. He will act as chief advisor in the administration of the Army's $500,000,000 procurement program in the area and six other western states. Mr Heacock served as Caterpillar's president from 1930 to 1941 when he became chairman of the executive committee.

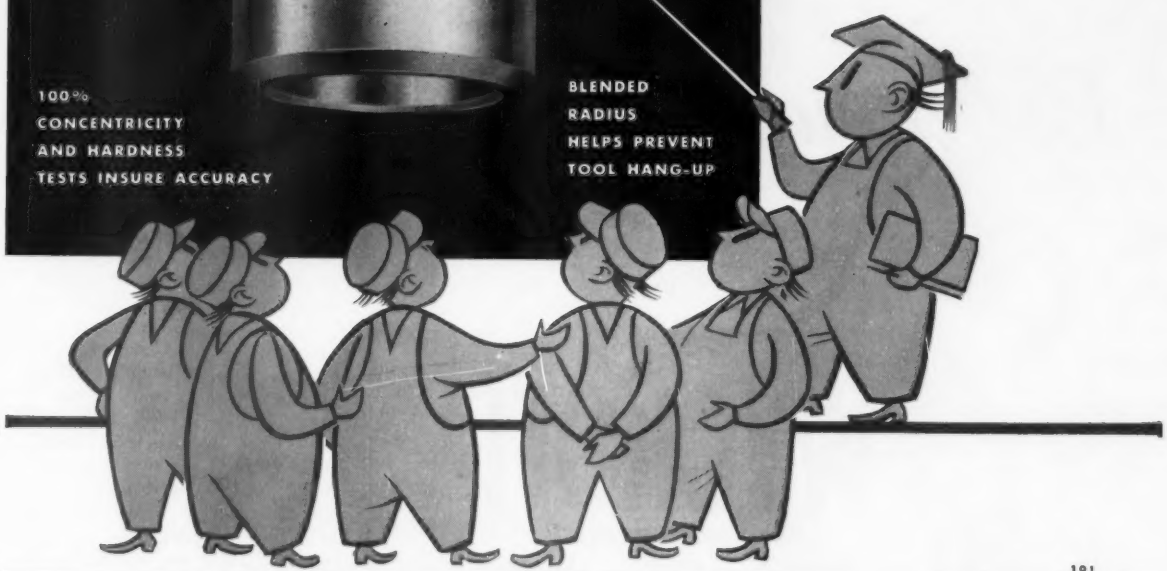
Clarence R Burrell, vice president in charge of sales of the Tool Steel Gear & Pinion Co, Cincinnati, has been appointed director of the General Components Div, Business and Defense Services Administration, Washington. He succeeds **Victor A Spoehr** who is returning to his post as vice president and general manager of the H M Harper Co, Morton Grove, Ill. Both men serve the BDSA under an executive rotation system by which the services of outstanding business men are made available to the government without compensation. Mr Burrell previously served the government on loan from his company when for nine months in 1951 he was chief of the Mechanical Power Transmission Branch of the General Components Div, NPA.

UNIVERSAL DRILL BUSHINGS

INSURE PERFECT ALIGNMENT AND LONG LIFE OF PRODUCTION TOOLS

SUPERFINISH BORES REDUCE TOOL WEAR
KNURLED HEADS PROVIDE GOOD GRIP
100% CONCENTRICITY AND HARDNESS TESTS INSURE ACCURACY
BLENDED RADIUS HELPS PREVENT TOOL HANG-UP

Universal Drill Bushings are available in a complete range of standard sizes and lengths. Special sizes made to order. Write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.



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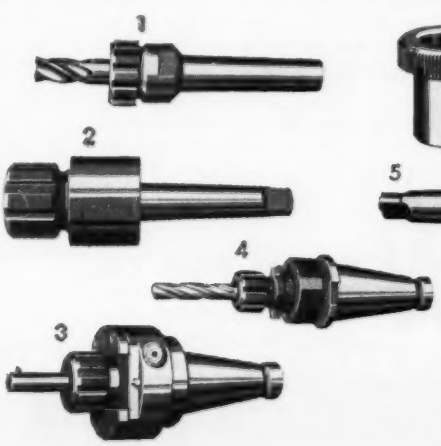
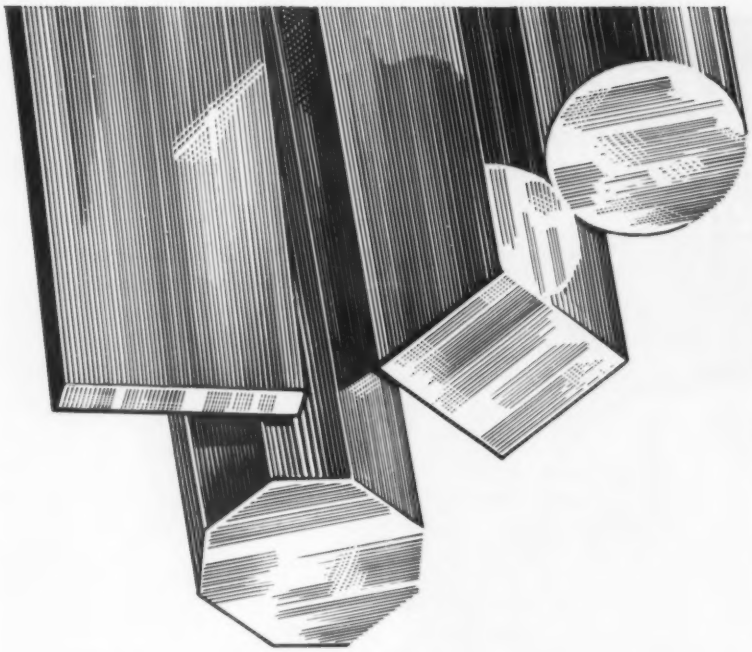
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 1
MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER



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EXPERIENCE means not only length of time devoted to the refinement of a product but includes, as well, the diversity of product requirements solved. **WYCKOFF**, throughout its history, has specialized in the production of fine quality cold finished steels—in all commercial forms and for the broadest range of specifications.

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ENGINEERING FORMULAS AND TABLES —*Published by Lefax Publishers, Philadelphia 7, Pa. 350 pages. Price, $2.75*

Newly revised tables of basic formulas, design data, and other statistical information for civil, mechanical, and electrical engineers. Data is condensed and indexed, and printed tabs help rapid finding of information desired. Pocket-size.

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ETUDE DE LA LUBRIFICATION ET CALCUL DES PALIERS. LOIS THEORIQUES ET EXPERIMENTALES (STUDY OF THE LUBRICATION AND CALCULATIONS OF BEARINGS. THEORETICAL AND EXPERIMENTAL LAWS)—*By L Leloup, University of Liege. Published by Dunod, 92 Rue Bonaparte (VI) Paris, France. 296 pages, 6½x9¾ in. Uncut. Paper bound. Price 2100 francs ($6 approx).*

The aim of this book is to make clear the phenomena of friction and lubrication, particularly in the field of hydrodynamics, and to provide a sure and proven method of calculation. The work is not limited to pure theory, but gives practical examples.

The author claims that his methods of calculation are not only original, but are far more accurate than any hitherto known in France or abroad, and it is said to be the only book of its type published in French.

This reviewer confesses to an insufficient knowledge of the mathematics and engineering theory involved for a proper judgment of the work, together with a somewhat limited familiarity with technical French, but it appears to be well prepared, and one may certainly rely on the authority of the author, a civil engineer of Liege in charge of the course at the University and director of the laboratory of machine description and of construction of alternating current machines.

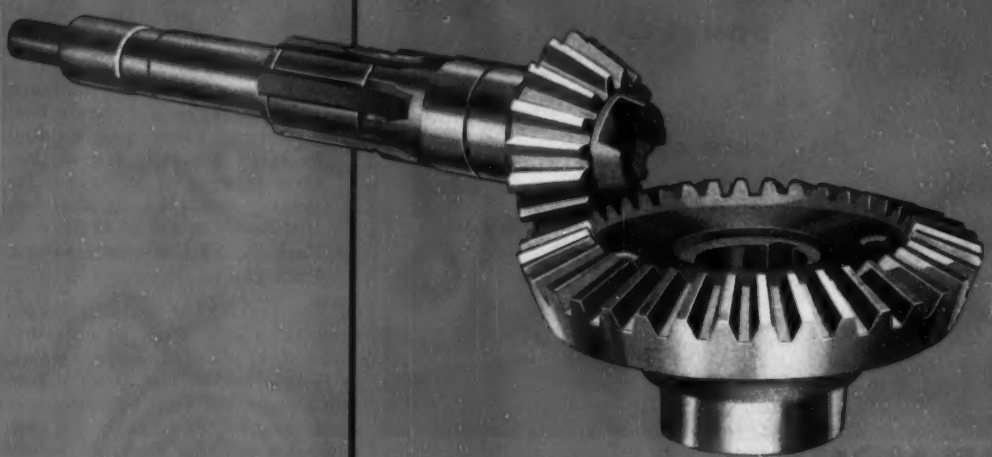
•

TRAITE THEORIQUE ET PRATIQUE DES ENGRENAGES (THEORETICAL AND PRACTICAL TREATISE ON GEARING) VOL. 1. (2ND EDITION)—*By G Henrio. Published by Dunod, 92 Rue Bonaparte, Paris, France. 394 pages, 6¼x9¼ in. Price 3500 francs ($10 approx).*

Considerable change has been made in the contents of this second edition, particularly on the chapters dealing with tooth corrections and calcula-

GEARS

for every purpose



Skilled Illinois Gear craftsmen are at your command to produce gears for every purpose—from gears rotating the massive, grinding weight of 100 ton shovels to gears controlling the tension of huge cylinders that speed delicate tissues through paper mills at thousands of feet per minute.

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This exactness means that Double-Circle Reamers give more cutting mileage . . . fast cutting action ...smooth finish...require a minimum of shut-down time for sharpening . . . lower tool costs for you.

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tions. These have been brought up to date to agree with the latest developments in the field. An extremely valuable new chapter has been added to instruct the reader on modern methods of increasing the strength of gear teeth. This takes into account the various types of trouble encountered with gears, and suggests such preventive treatments as shot-peening, plating, and improved surface finish.

The book is a complete treatise, starting with a brief review of elementary theory and continuing into the advanced geometry of gearing. It will be of value to both designers and users of gearing. The text is well illustrated, and seven large plates are included in a special envelope attached to the inside back cover.

•

WELDING ENGINEERING—*By Boniface E Rossi, exec sec'y, Pressure Vessel Research Committee, Welding Research Council; special lecturer in welding at Stevens Institute. Published by McGraw-Hill Book Co, 330 W 42 St, New York 36, NY. 786 pages, 6x9 in. Price $8.*

Of the making of welding books, there is no end. Each, of necessity, treats of certain fundamentals which, in themselves, permit of no important change, but must be thoroughly understood by the student. Yet each new book manages, somehow, as this one does, to explain these fundamentals in a more interesting, logical or simpler fashion.

Beyond this fundamental section, the book proceeds to a discussion of the metallurgy of welding and the

"Ready for another hard day's toil, eh, Quinley?"

weldability of common and not-so-common metals. The third section deals with the engineering side of welding and treats of the actual design of welded joints and structures, calculations of the strength of welded joints, and methods of estimating the costs of such joints. Production practices and the design of welding jigs are also considered.

Testing and inspection are dealt with at some length, and appendices cover such matters as welding terms and definitions, a bibliography, visual aids, questions and problems, and engineering data and tables.

The text is arranged in logical sequence for instructional purposes and covers the latest developments in the field, many of which have not previously been treated in textbook form. These include cold welding; multiple-electrode submerged-arc welding; inert-gas metal arc welding with consumable electrodes, such as the semi-automatic process; contact-arc and multiple-arc welding; pressure gas welding; stud welding; induction welding; and flow welding.

•

DESIGNING BY PHOTOELASTICITY — *By R B Heywood, principal scientific officer, Structures Dept, Royal Aircraft Establishment, Farnsborough, England. Published by Chapman & Hall, 37 Essex St, London, W C 2, England. 414 pages, 5½ x 8½ in. Price, 65s (about $9.10).*

This book provides a detailed description of how to apply the methods of photoelastic stress analysis to mechanical design. The discussion is quite complete, covering the basic principles of photoelasticity, mate-

"How'd'ya like that guy . . . complains about the way we've been stacking the tote boxes and then turns and runs away."

If your worm gear drive passes this test...

it must be a CLEVELAND

THIS precision testing machine analyzes a worm's profile. It detects the slightest deviation in form and lead from thread to thread.

That's important. Unless worm contours match exactly those of the mating gear, you can expect drive troubles—undue wear, unwanted speed fluctuations, ragged drive performance.

Cutaway shows compact interior design and construction of a typical Cleveland worm gear speed reducer.

EVERY CLEVELAND PASSES THIS TEST

More than that, each Cleveland worm must pass this test within microscopic tolerances! This guarantees a perfect match between wear-resistant case-hardened steel worm and nickel-bronze gear. No wonder experience shows that Cleveland worm gear speed reducers usually outlast the life of the machines they drive.

Why not ask the Cleveland representative who serves you to explain all the advantages of America's most dependable worm gear drive and see how it can help you? Write for Catalog 400. The Cleveland Worm and Gear Company, 3254 East 80th Street, Cleveland 4, Ohio.

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rials and equipment required, methods of preparation of models, and procedures for interpretation of results. Then various typical mechanical forms are analyzed, such as notches (including gear teeth), threads, holes, and fillet designs. This last subject is treated in some detail, and is one of the most useful and interesting chapters of the book. Finally, methods are given to predict variations between theory and practice, to make laboratory results more significant to the practicing designer.

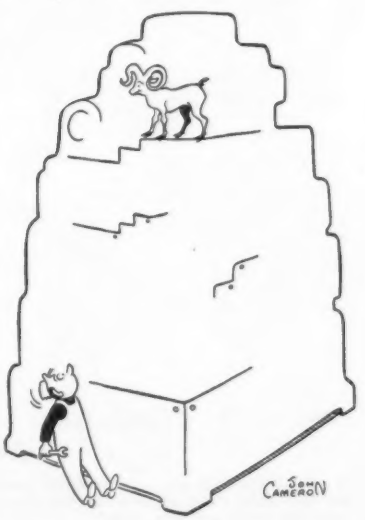
Included at the end of the book is a useful reference section listing more than 800 articles and books relating to the photoelastic method.

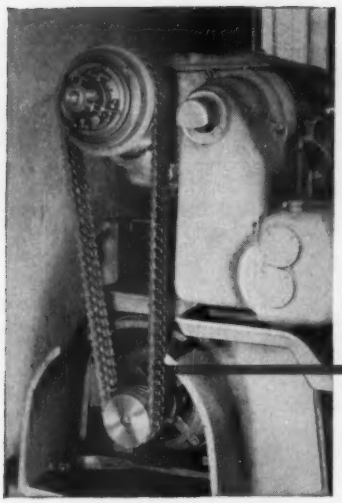
This book is especially timely, with the increasing need to make aircraft components of absolute minimum weight consistent with the job the part must do. Photoelastic stress analysis is a powerful tool for designers seeking to make the "ideal" part, in which "failure at all points is only just avoided in service."

•

EQUIPMENT, PRODUCTIVE OUTPUT, AND ECONOMIC ASPECTS OF MODERN MACHINE TOOLS (AUFWAND, LEISTUNG UND WIRTSCHAFTLICHKEIT NEUZEITLICHER WERKZEUGMASCHINEN—*Published by Verlag W Girardet, Gerswidastrasse 2, Essen, Germany. 188 pages, 9x12 in. Price DM 36.*

The proceedings of the 6th Aachen Machine Tool Meeting are collected in book form in this new volume. It deals with design trends among foreign machine tool builders, and discusses present-day concepts of construction, application, and utilization of modern metal-cutting machines. Economic considerations are dealt with from the viewpoint of





Performance Proves 20% to 90%

LESS VIBRATION

with Veelos—the Balanced V-belt

Engineers have long known that there are four principal causes of machine vibration: 1. bearings; 2. motor; 3. clutch; 4. sheaves. Often overlooked is a fifth cause: v-belts. And, in many instances, *v-belts alone* are the major cause of vibration.

There's a logical reason for this.

Regular v-belts have spots of varying density due to their construction. Normally, these spots are not apparent, yet they throw the belt out of balance when the drive is operating. As a result, vibration is created that can damage bearings, shafts and, most important, the finished work.

This is not true of Veelos v-belts.

Veelos is absolutely uniform throughout its entire length. Every link and every stud is identical. The smooth, machine-cut sides and the laminated construction assure smooth, vibrationless power delivery. Veelos is perfectly balanced.

In case after case, installation of Veelos v-belts has reduced machine vibration 20% to 90%.

Proof that Veelos will reduce vibration can easily be demonstrated with an electronic vibration analyser. This analyser measures amplitude of vibration to as low as 2-millionths of an inch.

Fifteen minutes of your time is all that is required to show you with the electronic analyser that Veelos creates less machine vibration. Drop us a line or clip the coupon for a demonstration.

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Yes, I would like a demonstration. **Have your representative call me for a convenient time.**

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IRON AND BRASS CASTINGS

FASTER FROM BALDWIN

New equipment and regrouped facilities make Baldwin an even better source for brass castings of all sizes. Deliveries have been speeded up 220%, castings are more uniform in grain structure and have much better finishes. In addition, casting prices have been lowered as much as 30%.

The lower photo shows two "squeezer" machines that are among the new equipment accounting for faster production and finer quality. Molds all ready for pouring are produced by these squeezers. With the two halves of a pattern mounted on opposite sides of a plate, the complete mold is squeezed in one operation. The operators then lift off the top half, remove the plate, mate the two halves and remove them from the flasks onto the conveyor where the clamping flask and weight are added for pouring.

Note the clean, smooth surfaces of the plug-valve bodies (upper photo) that were molded on the squeezer machines. Baldwin's exceptionally close control of sand mixtures assures *you* such fine finishes that you can count on further savings due to a great reduction in the amount of machining required to produce your finished article.

For further information about the 110 brass and 20 iron alloys that are available in Baldwin castings, write for catalog 6000 to Dept. 5702, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pennsylvania.

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both manufacturer and user alike.

Reports by distinguished engineers cover tool wear, temperature distribution at cutting edges, relation between crystalline structure and machinability, and tool vibration. Also covered are such subjects as the effect on economical operation of fixed-speed ranges versus steplessly variable drives, uses of control devices to obtain more economical production, and quality improvement obtainable by improvements in machine ways, frames, and columns.

Complete familiarity with engineering German is essential for an understanding of this book, but those able to read it will find it of the utmost value in helping to develop methods of increased production.

•

POSTWELD HEAT TREATMENT OF AUSTENITIC WELDMENTS. RECOMMENDED PRACTICE D10.1-53T—*Published by the American Welding Society, 39 West 39th St, New York City 18. Four-page pamphlet, 6x9 in. Price 50 cents.*

With increased use of the austenitic steels, particularly for piping and pressure-vessel fabrication, considerable confusion and misunderstanding has occurred regarding the need for stress relief and the effects of such heat treatment on the performance of weldments in service.

The Recommended Practice summarizes the consideration necessary to determine whether, for a given application, stress relief should be used, and if so, at what time and temperature. The recommendations represent the practices deemed most acceptable by a group of authorities on the subject, based on studies and actual industrial practice.

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use *complete* motors with *no* modifications

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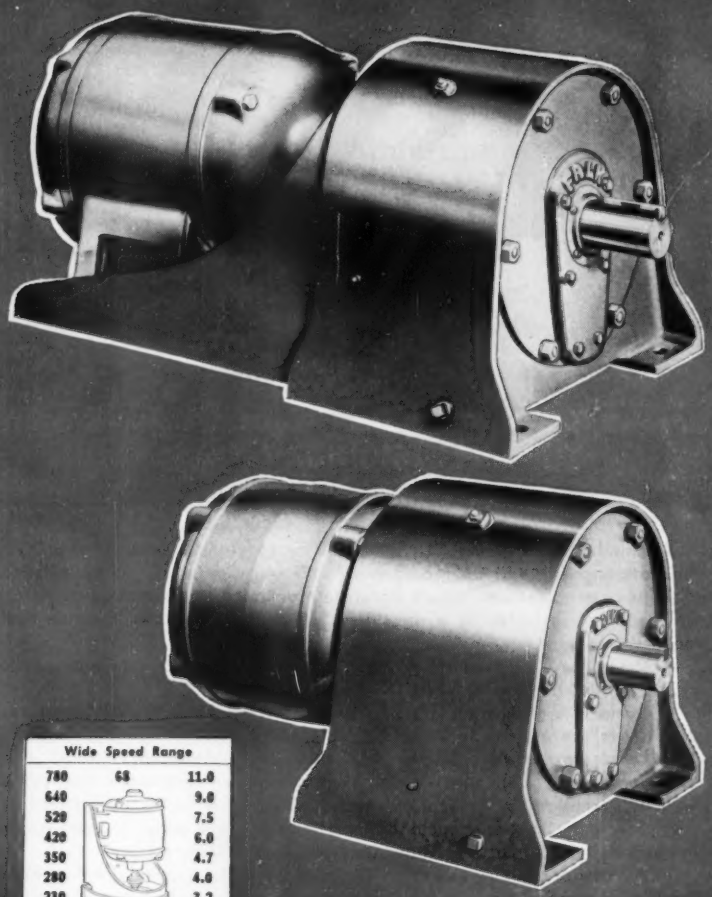


Wide Speed Range		
780	6S	11.0
640		9.0
520		7.5
420		6.0
350		4.7
280		4.0
230		3.2
190		2.7
155		2.2
125		1.8
100		
84		

You never have the annoying problem of motor modification when you standardize on *all-steel* FALK Motoreducers. Both the universally popular All-Motor type and the newly redesigned Integral type use *completely standard motors without modification.* The motor can be quickly and easily replaced by another standard motor of any make, type or speed within the unit's AGMA rating when necessary without disturbing the reducing unit.

Many users choose the All-Motor type because it permits easy interchange of motors, *or even parts,* on the job, *in minutes*—and because reducer units and/or motors may be readily transferred from one line or plant location to another. Other users select the new Integral type with standard D-flange NEMA motor because it is a highly compact, streamlined unit providing the utmost in space economy.

In every FALK Motoreducer—All-Motor or Integral—the output speed (ratio) can be changed within the unit's torque capacity without modifying the motor.

Both types give you all the quality, adaptability, dependability and long-range economy for which FALK has been celebrated for more than sixty years. FALK Motoreducers are available from factory, field or distributor stocks throughout the country. Write to Department 247.

Every FALK Motoreducer has these "In-built" Factors—

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

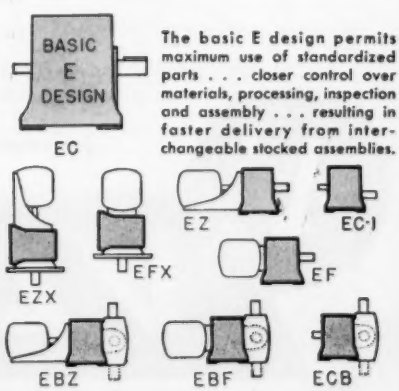
Sealed Housings. Dual closures and one-way vents keep oil *in,* dust and moisture *out.* Units are splash-proof, leakproof, dustproof.

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.



The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

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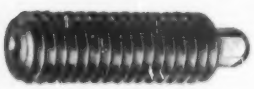
MAKE GOOD WORKMANSHIP BETTER

Wherever positive spring tension is required!



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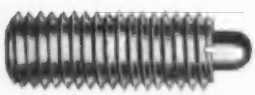
Hexagonal end simplifies adjustment and removal.
Standard Hex End: 4 sizes from ¼-20 to ½-13, with end pressures of 8 to 12 lbs.
Silvernose Hex: 4 sizes from ¼-20 to ½-13, with lighter end pressures of 2½ to 6 lbs.



STANDARD

Wherever positive spring tension is required . . . Facilitates fast loading and unloading of jigs and fixtures.
Standard End: 10 sizes from #6-32 to 1"-8, with end pressures of 3 to 42 lbs.
Silvernose: 7 sizes from #6-32 to ½-13, with lighter end pressures of 1 to 6 lbs.

Whether your production is routine or specialized you will find Vlier "performance proven" plungers are "uniformity assured" to do a better job. They speed set-ups, assure accurate machining and curtail unnecessary waste. When re-surfacing a die, Vlier Spring Plungers save hours of toolmakers' time.

There are 37 different types and sizes, each engineered for a specific need. Other sizes added when required.

Distinctive ends (light for light pressures, dark for heavier pressures) assure positive, quick identification.

Factory pre-set end pressures provide secure contact at all times. Inset hexagonal ends allow simple, quick adjustment with standard Hex key as well as permitting full utilization of screw length for better adjustment.

Screw portions are machined from selected steel alloy, plunger is case hardened; both are rust-resistant and can last a lifetime.

An assorted stock of Spring Plungers on hand assures greatest economy for it provides your tool engineers with a selection of the proper size and end pressure for every tooling requirement.

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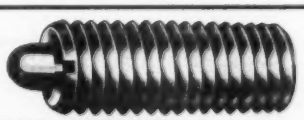

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Designed for work with aluminum, brass and other relatively soft, easily marred metals.
Type A (dark): 6 sizes from #8-32 to ½-13, with end pressures of 5 to 12 lbs.
Type B (light): 6 sizes from #8-32 to ½-13, with lighter end pressures of 1½ to 6 lbs.

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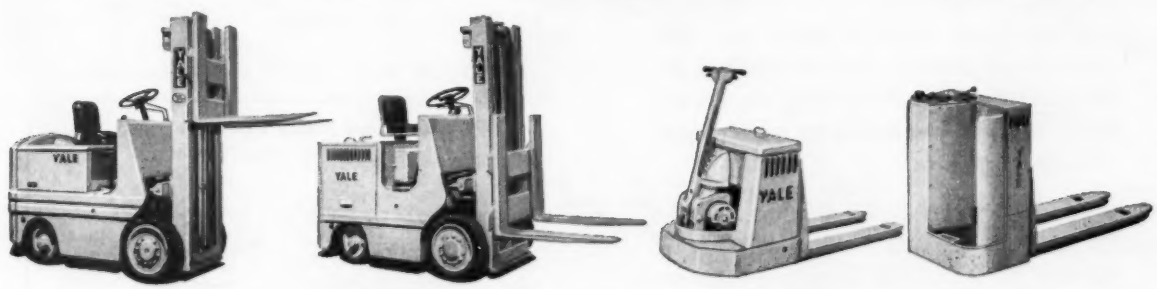

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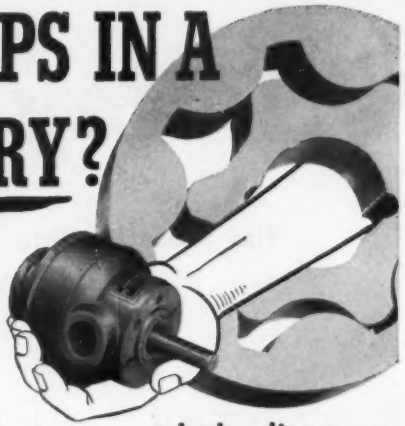

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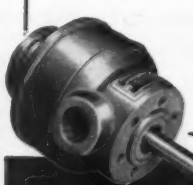
The two Gerotors revolve at different speeds, resulting in a continuous opening and closing of spaces as shown in this diagram. Follow the changing position of tooth #1 as rotation takes place. Note its relation to space #2. As rotation continues, tooth #1 gradually displaces oil from space #2, thus creating pressure.



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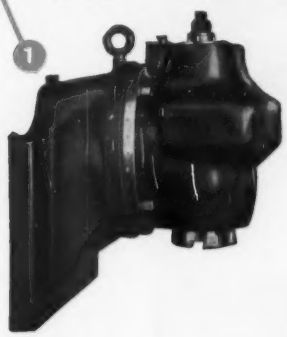
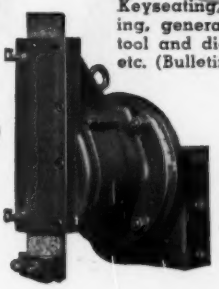
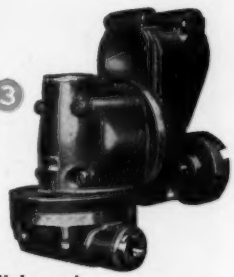
You can easily convert your general duty Milling Machine to a special purpose Miller by utilizing Kempsmith Standard Attachments. They can handle a great variety of milling operations with speed and precision, thereby enabling you to step up your plant production. Attachments 1 to 3, shown below, can be mounted on Kempsmith Millers. Numbers 4 to 7, inclusive, can be mounted on ANY make of milling machine. The same high degree of rigidity and precision characteristic of Kempsmith Milling Machines for more than 60 years is embodied in these sturdy standard attachments. Thousands are serving industry every day, performing the most delicate and accurate operations, or handling difficult production milling jobs. So plan now on broadening the scope of YOUR milling machines by applying Kempsmith Attachments. Write for bulletins.

Vertical Head
Converts horizontal to vertical machine, retaining identical spindle characteristics. (Bulletin No. 105)

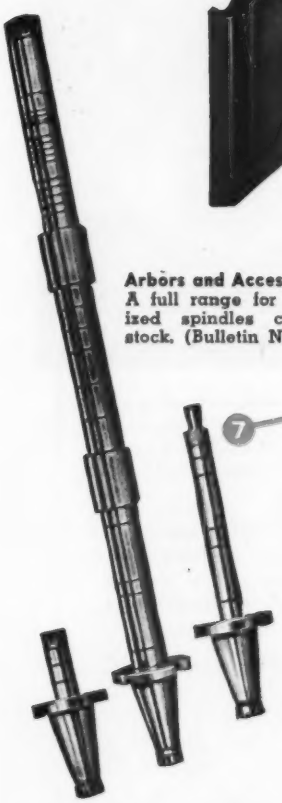


Slotter
Keyseating, broaching, general slotting, tool and die making, etc. (Bulletin No. 107)





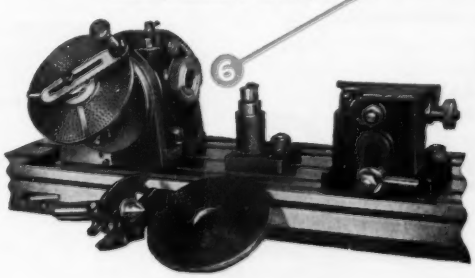
Hi-Speed Universal
High speed angular milling in all planes. (Bulletin No. 113)

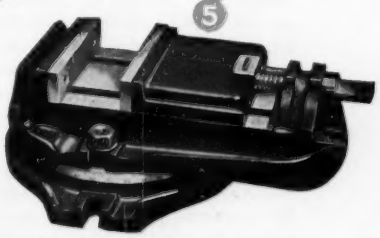


Arbors and Accessories
A full range for standardized spindles carried in stock. (Bulletin No. 116)

Circular Table
Milling circles or cams, gear cutting, high-speed continuous milling, etc. (Bulletin No. 106)

Dividing Head
Precision indexing. Spiral cutting mechanism and chuck also available. (Bulletin No. 119)





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Standard and Heavy-Duty, plain and swivel types. Adaptable to special jaws to save fixtures. (Bulletin 117)

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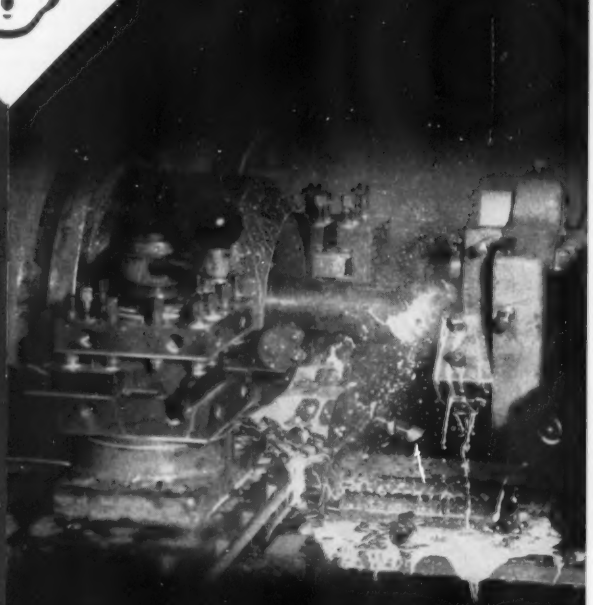
EXACT WHEELS... incredible production SPEEDS

by BAY STATE

by Jones & Lamson



THIS WHEEL Sharpens Tools For This *FAST* PRODUCTION

BRILLIANT RESEARCH, by progressive companies like JONES & LAMSON, has stepped up top metal-turning speeds from the old 200 s.f.m. to 1200 s.f.m. and even more! For such amazing speeds, precision tool-grinding becomes highly critical, demanding perfection in grinding wheel performance.

J & L, for example, finds BAY STATE'S C-80G9-V3, 12" x 1" x 1" wheel the exact one for maximum production, accuracy, and efficiency in grinding the carbide-tipped turning and facing tools for such high speed operations.

The "V3" portion of this specification is an important factor in the superior performance of these BAY STATE wheels. The figure 3 signifies one of those extra sub-divisions of hardness that only BAY STATE offers.

These FRACTIONAL GRADES allow exact grinding wheel specification. Capable BAY STATE engineers are at your service to help you select these pin-pointed specifications as required for your grinding operations.

Just ask for BAY STATE "On-The-Job" Engineering Service.

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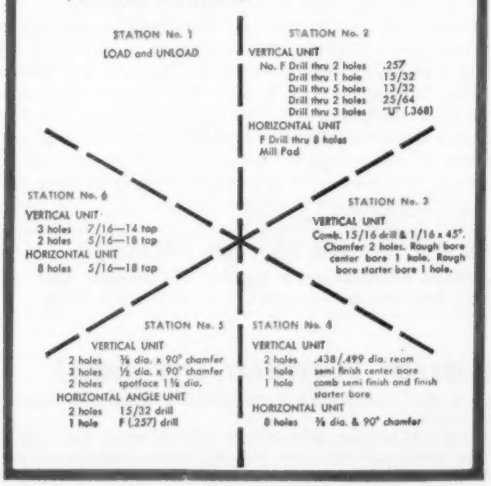
DRILLING PROBLEM **SOLVED**

with a **BAKER** SPECIAL MACHINE

Baker Multi-Operation Machine utilizing standard Baker 7½ x 16 and 15 x 16 units and a 72" six-station power indexing table, performs drilling, chamfering, boring, counterboring, and tapping operations on clutch housings at the rate of 80 parts-per-hour at 100% efficiency.


STATION No. 1
LOAD and UNLOAD
STATION No. 2
VERTICAL UNIT
No. F Drill thru 2 holes .257
Drill thru 1 hole 15/32
Drill thru 5 holes 13/32
Drill thru 2 holes 25/64
Drill thru 3 holes "U" (.368)
HORIZONTAL UNIT
F Drill thru 8 holes
Mill Pad
STATION No. 6
VERTICAL UNIT
3 holes 7/16—14 tap
2 holes 5/16—18 tap
HORIZONTAL UNIT
8 holes 5/16—18 tap
STATION No. 3
VERTICAL UNIT
Comb. 15/16 drill & 1/16 x 45°. Chamfer 2 holes. Rough bore center bore 1 hole. Rough bore starter bore 1 hole.
STATION No. 5
VERTICAL UNIT
2 holes ⅜ dia. x 90° chamfer
3 holes ½ dia. x 90° chamfer
2 holes spotface 1⅜ dia.
HORIZONTAL ANGLE UNIT
2 holes 15/32 drill
1 hole F (.257) drill
STATION No. 4
VERTICAL UNIT
2 holes .438/.499 dia. ream
1 hole semi finish center bore
1 hole comb semi finish and finish starter bore
HORIZONTAL UNIT
8 holes ⅜ dia. & 90° chamfer

Baker Special Drilling Machines, composed of standard Baker units arranged to suit each individual problem, are designed for *productivity*. Units arranged in vertical, horizontal and angular planes perform multiple operations *faster . . .better . . . automatically* . . . with greater accuracy and efficiency. Consult Baker engineers for a better solution to your drilling problems.

..SINCE 1867

BAKER BROTHERS, INC. Toledo, Ohio

DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES

No. 122 of a Series of Typical Installations

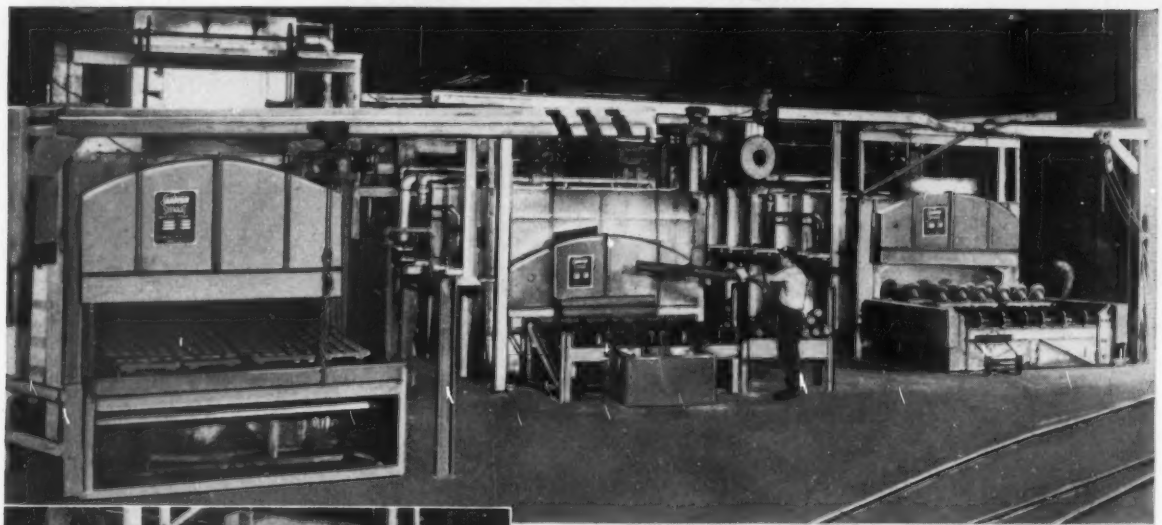
Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE

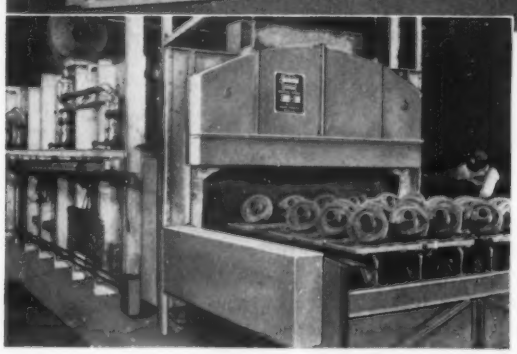
HOW SUNBEAM FURNACES HELP MANUFACTURERS REDUCE COSTS AND KEEP THEMSELVES COMPETITIVE

CONTINUOUS NORMALIZING, HARDENING AND TEMPERING OPERATIONS

At KROPP FORGE COMPANY, Chicago, Ill.



General view of the three integrated Sunbeam Stewart furnaces used for tempering, hardening and normalizing. The cycles in all three furnaces can be synchronized so that forgings make a continuous trip through all three furnaces.



Discharge end of the normalizing furnace showing the cooling table where forced draft is used to facilitate the cooling of normalized parts. The over-firing dual-fuel burners can be seen along the side of the furnace. A mechanical extracting mechanism is also built into the table. This extractor enters the end of the furnace (after pushing cycle is complete), lifts the forging and sets it on the cooling table.

To meet their production requirements for a special type of forging, Kropp Forge of Chicago have been using Sunbeam Stewart furnaces for normalizing, hardening, and tempering. The normalizing furnace, a double row pusher type furnace, is 18" high by 90" wide by 32½' long (inside dimensions) and has a rated capacity of 6500 lb. per hr. The furnace is separated into two zones by a cooling chamber near the center of the furnace. This section does not contain any burners, but does have a fan which can blow cold air into the furnace through multiple openings to air cool the material in the furnace. The hardening furnace is a duplicate of the normalizing furnace, with the exception that there is no cooling zone in the center. The furnace is divided into two zones of control, 5 burners in each zone. There is a quenching tank and manipulator at the discharge end of this furnace. A quenching tank 7' in diameter by 10' deep is located slightly below floor level at the discharge end. A recirculating, double rail pusher type furnace is used for tempering forgings. The heating chamber in the furnace is 18" high by 90" wide by 45' long. This furnace has a rated capacity of 8500 lb. per hour.

MODERN AUTOMATIC HEAT TREAT EQUIPMENT MAY BE THE ANSWER TO YOUR PROBLEM

Sunbeam engineers can help you keep pace with modern production methods. Replacement of obsolete or inefficient heat treating equipment with an automatic Sunbeam installation reduces costs, improves quality, pays for itself in a short time.

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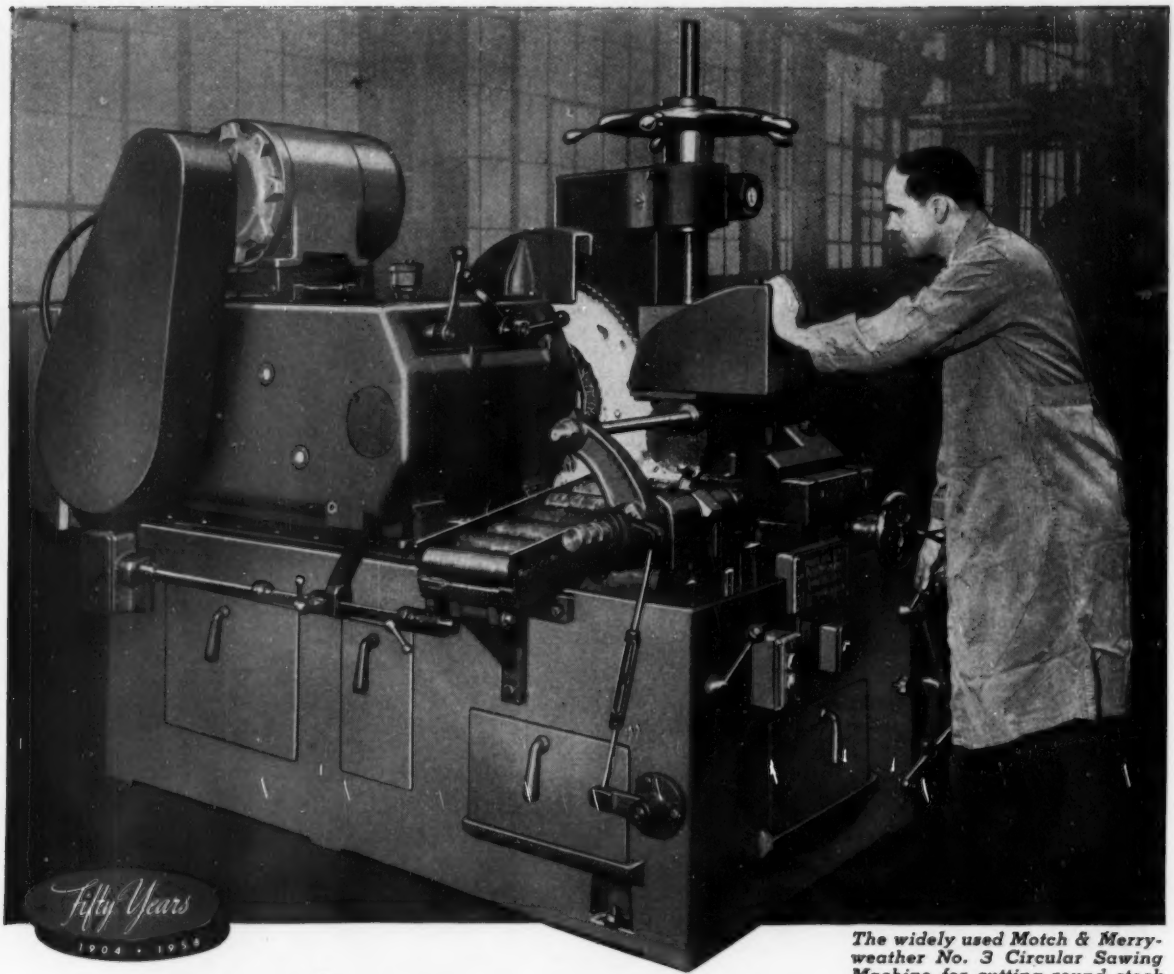
A letter, wire or 'phone call will promptly bring you information and details on SUNBEAM industrial furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a SUNBEAM engineer will be glad to call and discuss your heat treating problems with you.



The widely used Motch & Merryweather No. 3 Circular Sawing Machine for cutting round stock up to 10" diameter.

remember...

It's the Cost per Cut that Counts!

SECURE HIGH PRODUCTION AT LOW COST

For every ferrous or non-ferrous metal, for any shape or size, for production or short runs, – study *new high* records made by Motch & Merryweather Circular Sawing Machines employing the Triple-Chip Method and available in:

A complete size range for cutting stock up to 43" diameter.

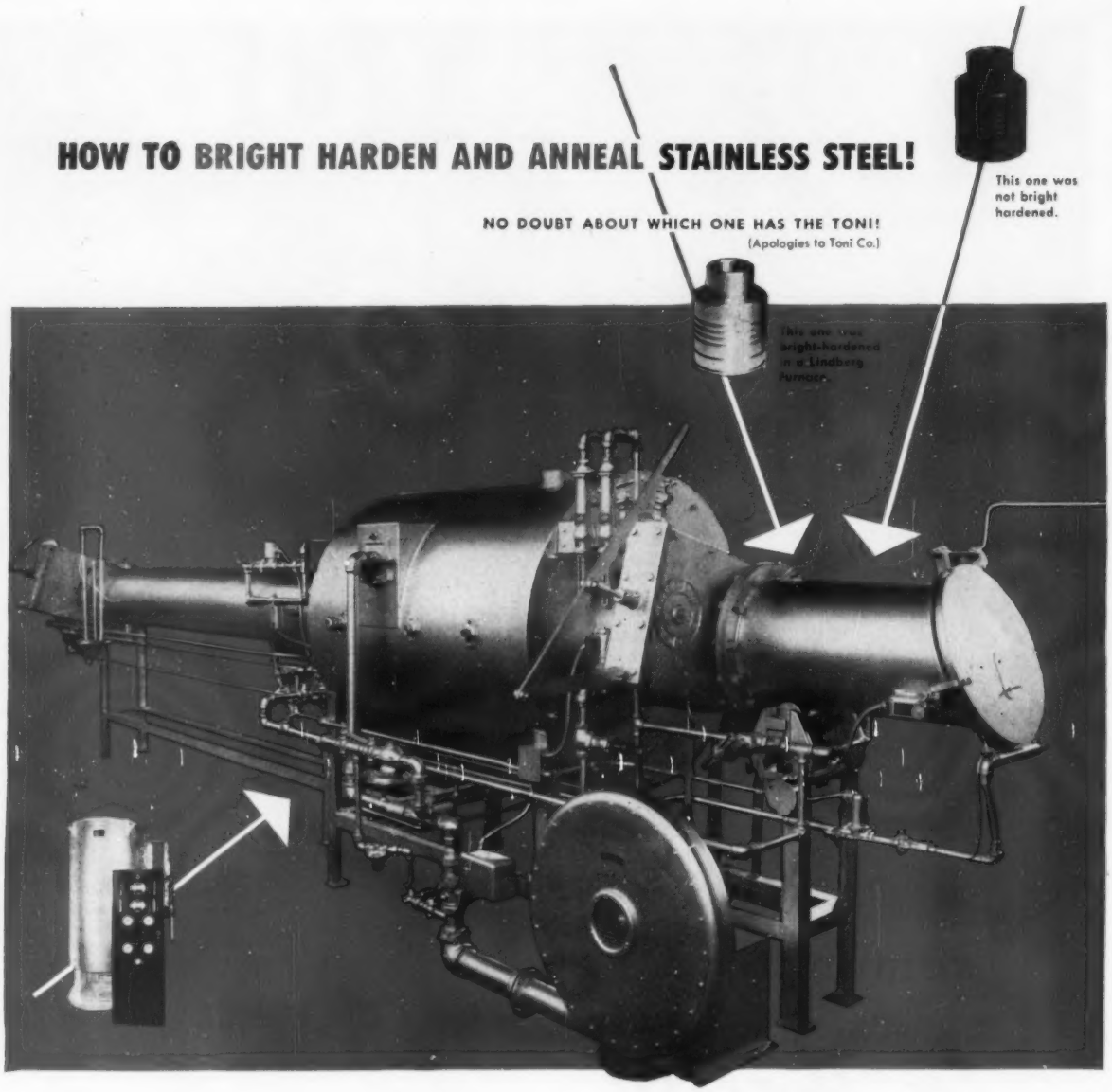
THE MOTCH & MERRYWEATHER MACHINERY CO.

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

HOW TO BRIGHT HARDEN AND ANNEAL STAINLESS STEEL!

NO DOUBT ABOUT WHICH ONE HAS THE TONI!
(Apologies to Toni Co.)



If your production requirements call for the bright heat treating of stainless steel, completely free from oxidation and discoloration . . you'll want to know more about this amazing Lindberg Stainless Steel Heat Treating Furnace, many of which have been in successful use throughout the country for 4 years. They are *specifically designed* for the heat treatment of stainless steels and other high alloy materials.

This process eliminates the need for operations such as pickling, sandblasting, and machining . . which are not only costly and time-consuming, but also often disturb the delicate balance of the alloying elements on the surface of the metal.

Lindberg Stainless Steel Heat Treating Furnaces are built with purging chambers at *both* the charging and the discharging ends. This eliminates the chance of work chamber atmosphere becoming contaminated by either oxygen or water vapor . . which will oxidize stainless steel.

These furnaces use protective atmosphere supplied by Lindberg HYAM Hydryzing Generators. Atmosphere consists of dissociated ammonia (75% hydrogen and 25% nitrogen . . dew point, minus 60°F).

Your "Lindberg man" will be glad to tell you more . . call him.

LINDBERG FURNACES

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Lehigh TRACER-TOOL easily takes 3/8" cut with .030" feed on Nitralloy bar

Whether it is taking a deep bite in tough metal, machining a blended radii to absolute precision, speeding production, or opening the door to profitable duplicating business, the Lehigh TRACER-TOOL has really proven itself to be a winner. Have you considered how it can fit your shop?

Model M-1500, illustrated below, is adaptable to lathes 16" thru 24". It is all mechanical – has no complicated electronic or hydraulic controls. It is quickly set up and requires no permanent lathe alterations.

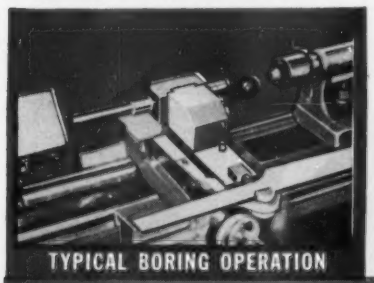
With it you can do *O.D. Contour Turning, I.D. Contour Turning and Boring, Shoulder Turning, Contour Facing, and Threading up to a shoulder.* Once it is set up an unskilled machinist can operate it.

Although the cost of a Lehigh TRACER-TOOL is a fraction of that of conventional duplicating equipment it will perform practically all of the functions of the most complicated, high-cost hydraulic-electronic machines. The following models are now available:

EL-1100 *to fit lathes* **9"-14"** *Price* ***$375**
M-1500 *to fit lathes* **16"-24"** *Price* **$725**
EL-2000 *to fit lathes* **24" and larger** *Price* **$975**

**Prices subject to change without notice*

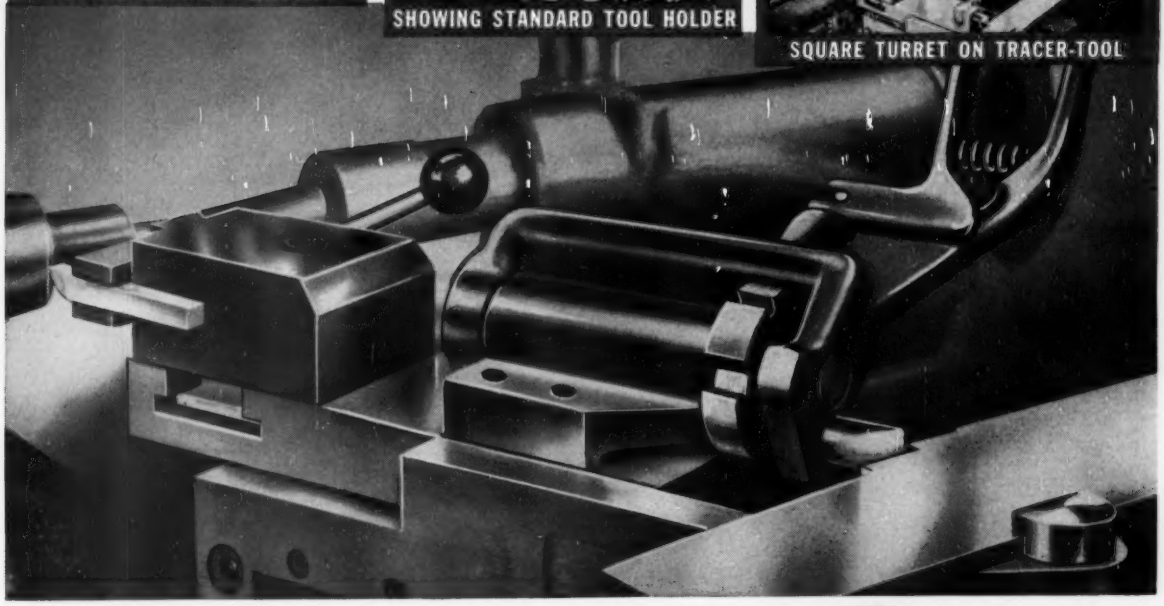
Makes precision duplicating practical on engine or turret lathes. Uses inexpensive and easily made templates.



TYPICAL BORING OPERATION

SHOWING STANDARD TOOL HOLDER

SQUARE TURRET ON TRACER-TOOL



Many fine engineering features:

EXCLUSIVE ROTARY STYLUS: Permits cross feed screw to be set and left in one position while successive pieces are machined. Speeds production.

ADAPTABLE TO VARIED TOOL HOLDERS: Can be used with a standard tool post, a quick change tool holder (illustrated), or a square turret.

PRECISION BUILT: Horizontal slide operates between pre-loaded ball bearings.

POSITIVE STYLUS CONTACT: Assured by air pressure applied to the tool through a pressure regulator and 3-way valve which is supplied. Shop pressure is sufficient.

Lehigh TRACER TOOL
PROFILE-TRACING LATHE ATTACHMENT

Our engineering department will be glad to advise you on any duplicating problem. Catalog on request.

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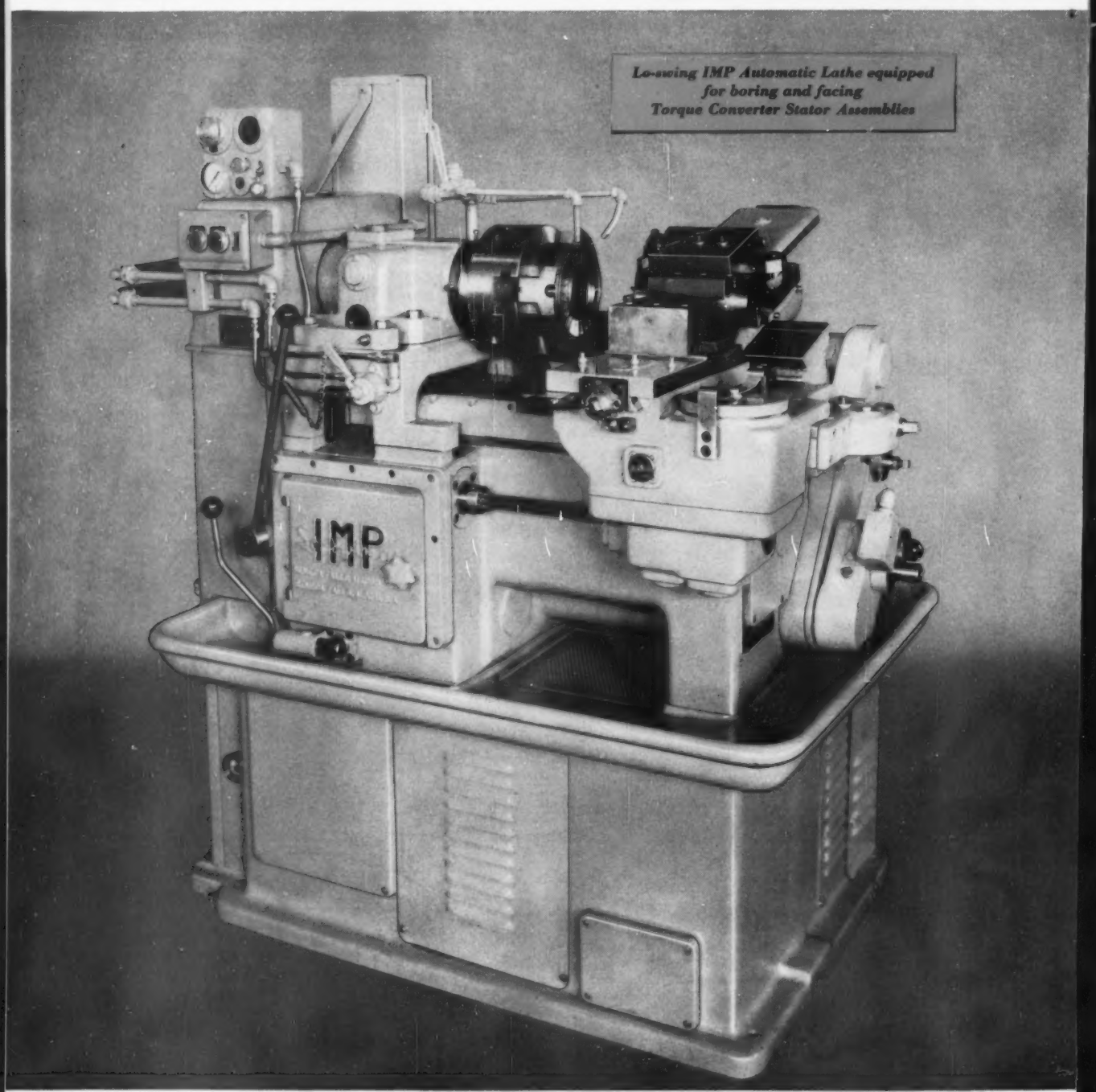
Manufacturers of a complete line of Air Valves • Air Cylinders • Air Hoists • Air Motors • Precision Castings Automatic Vending Machines • Commercial Refrigeration Systems and Units • Profile Tracing Lathe Attachments

West Coast Distributor: CAMPBELL CONTOUR ATTACHMENT COMPANY, 1320 W. Esther St., Long Beach, Calif.

MACHINE OF

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Lo-swing IMP Automatic Lathe equipped for boring and facing Torque Converter Stator Assemblies

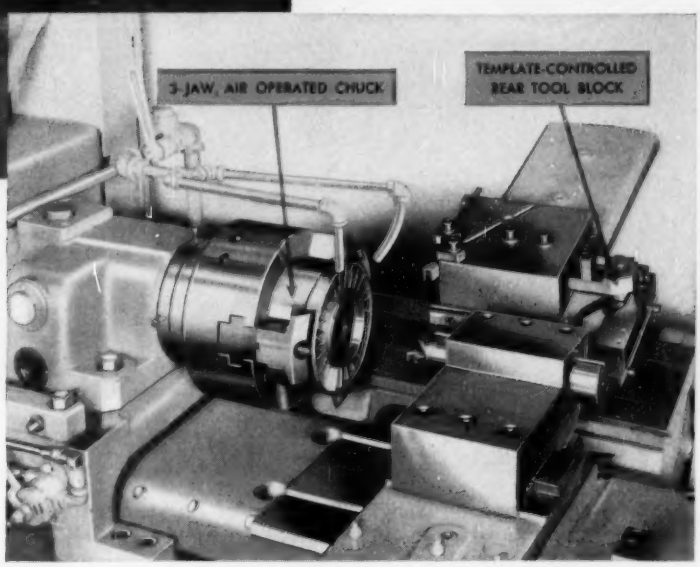
PRODUCTION COSTS

THE MONTH

AUTOMATIC TRANSMISSION PARTS MACHINED AUTOMATICALLY ON *Lo-swing* IMP

Left: Several of a group of Lo-swing IMP's used in machining Automatic Transmission Parts

Below: Close-up view of tooling



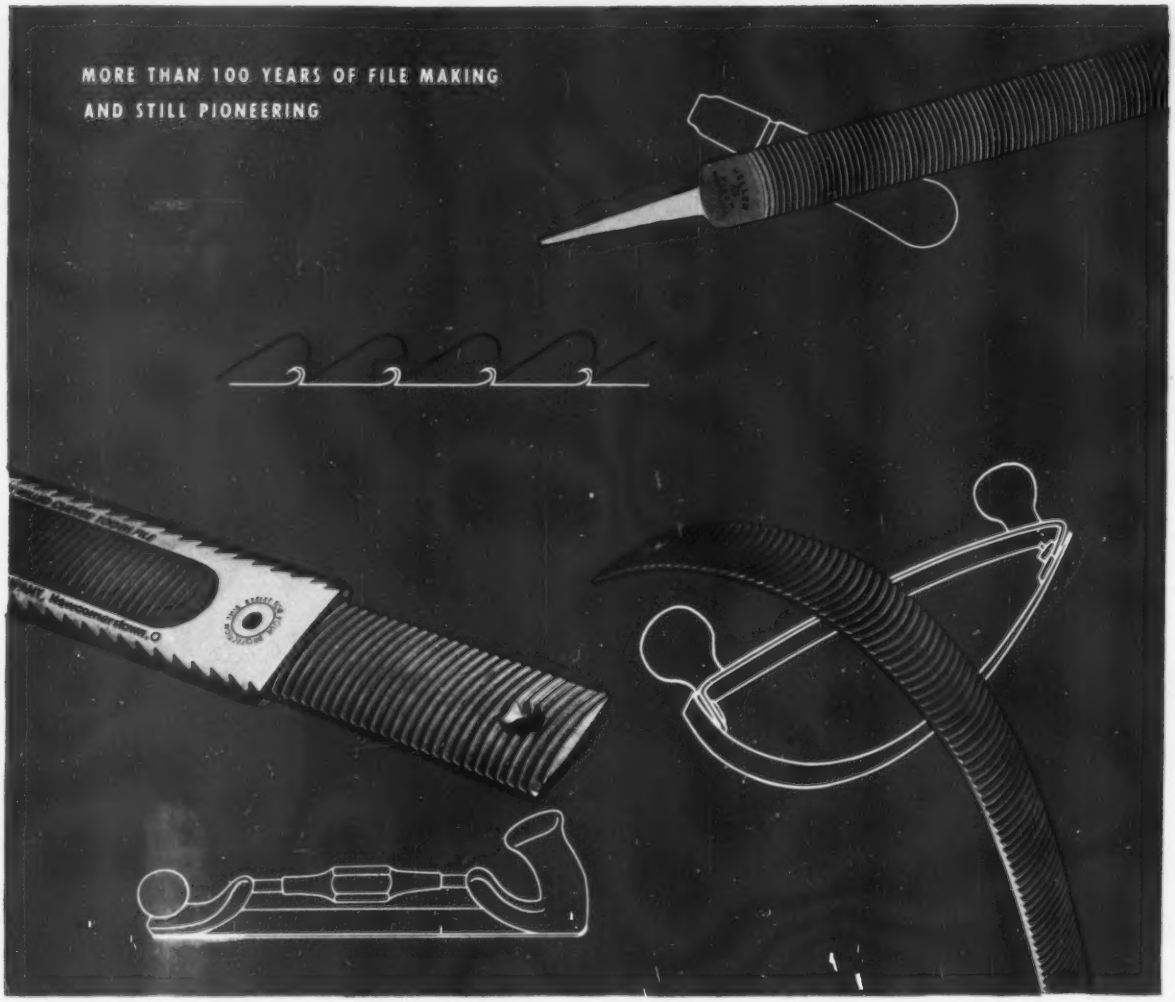
PROBLEM: To bore and face welded Torque Converter Stator Assemblies. Parts must be held without distortion and machined within close limits.

SOLUTION: IMP Automatic Lo-swing Lathes were selected for this work due to ease of operation, high spindle speeds, compactness and rigidity. The upper illustration shows several of a group of machines installed for this class of work. The lower illustration is a close-up view of one of the lathes, with coolant guard removed, equipped for boring and facing one of the Torque Converter Stator Assemblies. The part is held in a three-jaw, air-operated chuck fitted with wide mushroom type jaws to prevent distortion of the piece. The boring operation is made with two carbide tipped tools mounted in a boring bar and holder and fitted to the front slide. Tool relief is provided on the return stroke. The facing and trimming tools are mounted on a template controlled rear tool block which permits the facing operation to be made at the correct angle. The operation is entirely automatic, the operator simply loads and unloads the parts.

Engineered jobs are our specialty. Our staff is at your disposal to help solve your problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

ARE LOWER WITH *Lo-swing*



HELLER WAS FIRST WITH *VIXEN** MILLED CURVED-TOOTH FILES

Originated by Heller Brothers over 35 years ago, the Vixen still stands as the greatest single improvement ever made in metal finishing files. Each curved-tooth is actually a miniature milling cutter. Vixen cuts faster, freer, finishes smoother. File clears easily even when used on soft, non-ferrous metals or fibrous materials. Famous Vixen is only one of many Heller contributions to better filing. Over a century of continuous inspecting, testing and improving guarantees users of Heller files "the best."

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NUCUT* Wavy-Teeth Files
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WAVY-TEETH* Double Cut Mill and Saw Files

*Registered T.M.

VIXEN
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NUCUT

THESE 3 FAMOUS BRANDS ARE MADE ONLY BY

HELLER BROTHERS TRADE MARK SINCE 1836

HELLER BROTHERS CO. *America's Oldest File Manufacturer* **NEWCOMERSTOWN, OHIO**

YOUR *HELLER* DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS

THE

Delpark *Junior*

BRINGS

Greater Savings

TO MACHINES WITH 1/4 TO 1½ G.P.M. COOLANT FLOW

Greater savings through better finish, greater accuracy and more production are possible with the DELPARK Junior Coolant Filter on machines with low coolant flows.

Newest in a famous line, the DELPARK Junior now brings to the machine with small coolant flow, individual filtration with all the efficiency of the larger DELPARK Automatic Filter.

SAVINGS? . . . There are savings in the low cost DELPARK Junior . . .

—*Savings* in greater accuracy and better finish through free-cutting wheel or tool action . . .

—*Savings* in greater machine efficiency and production . . .

—*Savings* in labor and material . . .

—*Savings* in rejects . . .

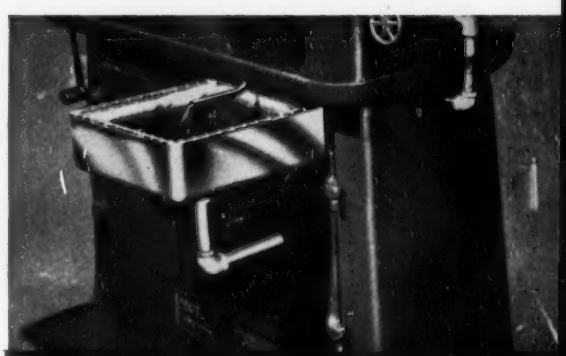
—*Savings* in grinding wheels and tools . . .

—*Savings* in maintenance and machine parts . . .

—*Savings* in coolants . . .

—and *Savings* in numerous other production and operation phases.

Write today for the new DELPARK JUNIOR BULLETIN.



Delpark Junior installation on gear hobber. Coolant flows through tray and returns to machine through lower pipe.

Delpark Junior serving small grinder. Unit rests on top of coolant tank and returns filtered coolant into reservoir.

Delpark

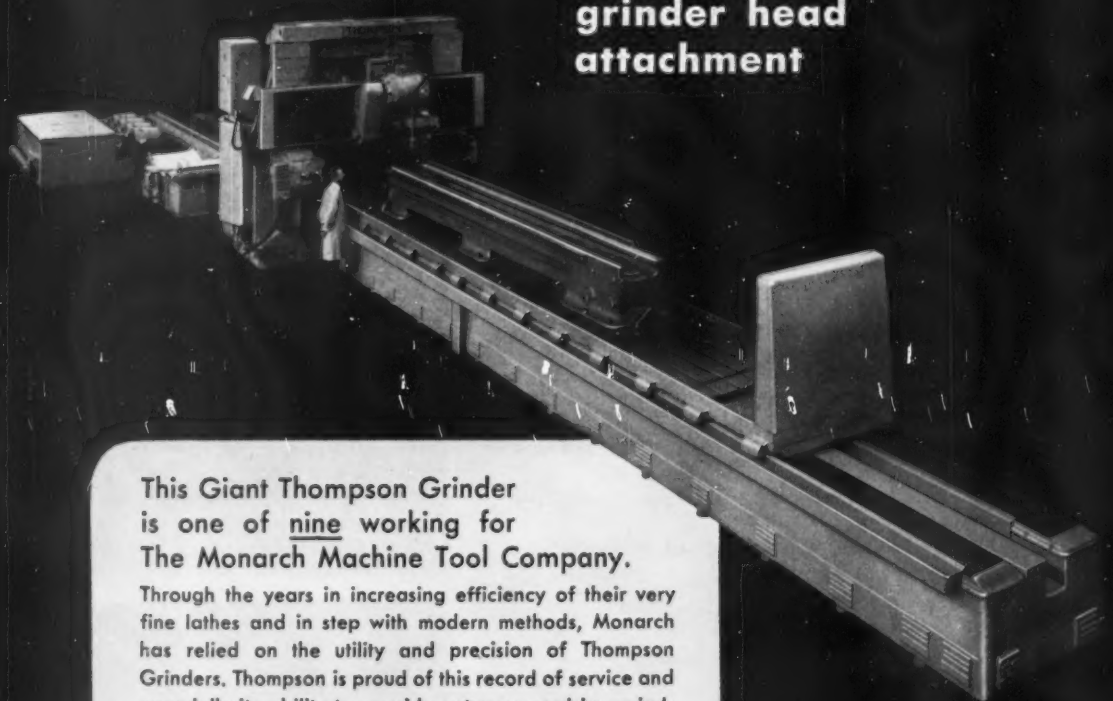
INDUSTRIAL FILTRATION

Backed by more than 30 years experience in Industrial Filtration

INDUSTRIAL FILTRATION COMPANY, 113 INDUSTRIAL AVENUE, LEBANON, INDIANA

Monarch

Replaces a planer equipped with grinder head attachment



This Giant Thompson Grinder is one of nine working for The Monarch Machine Tool Company.

Through the years in increasing efficiency of their very fine lathes and in step with modern methods, Monarch has relied on the utility and precision of Thompson Grinders. Thompson is proud of this record of service and especially its ability to provide extreme precision grinding on this largest of all surface grinders.

INSTALLS WORLD'S LARGEST...

Surface Grinder

precision grinding lathe bedways up to 32 ft. long to a tolerance of five ten-thousandths of an inch .0005"

The precision of Thompson Way Grinders is exemplified in this giant new machine recently installed in the plant of the Monarch Machine Tool Company of Sidney, Ohio. Monarch lathes are known the world over for their extreme efficiency and accuracy, therefore, in the machining of the bedways of their longest machines they had to depend on grinding equipment that maintained exceptional accuracy over entire surfaces up to 32 feet in length. This accuracy is perfectly maintained on this Thompson Way Grinder to five ten-thousands of an inch.

Thus, this surface grinder is not only the World's largest but size for size, one of the World's most accurate machines. The overall length is 79 feet and it measures 13 feet high and 13½ feet wide. Yet in spite of its size all operations are easily controlled by a single operator automatically from the convenient suspended push button control panel. This is typical of Thompson centralized control available with all types and sizes of Thompson Grinders. It will pay you to consult Thompson Engineers in finding an economical solution to *your* problems.

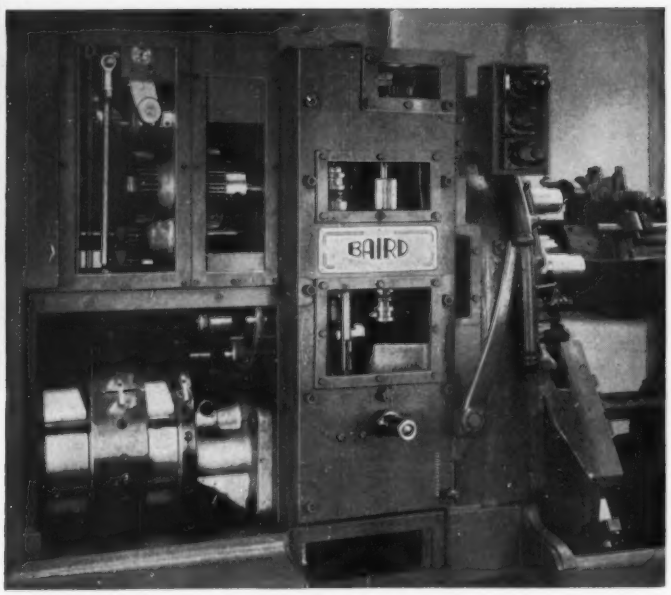
Have Thompson Engineers solve your grinding problems

THE THOMPSON GRINDER COMPANY
Springfield, Ohio

Thompson Grinders

. . . IF IT'S A HIGH PRODUCTION PROBLEM . . .

ASK BAIRD ABOUT IT



HERE'S BAIRD'S

Guinea Pig

WHERE WE WATCH OUR OPERATIONS . . . *FOR YOUR BENEFIT*

One of the features of Baird machines that customers like best is that when they are tooled and put on production . . . they produce. In many cases, however, arrival at that happy result in our customer's plant is by no means as simple as it sounds. Hence our "Guinea Pig" and other special Baird engineering procedures. The "Guinea Pig," as you can see from this photograph, is just that . . . a regular Baird Multiple Spindle Automatic, with plastic windows let into its "hide" at many vital points. By this means we can check details of operation under controlled conditions. Cams, gearing, controls, interlocks, tool slide action, temperatures, lubrication, wear . . . just about every factor in performance . . . is seen, gaged and compared.

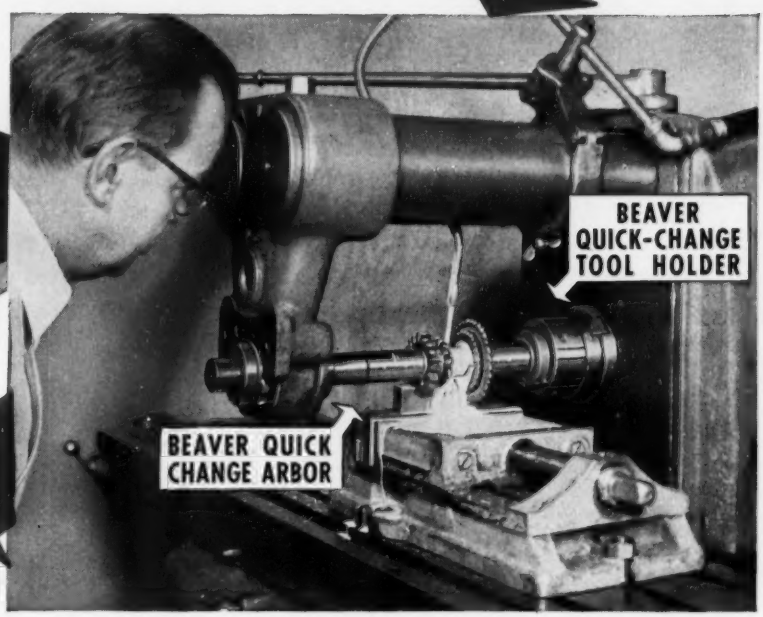
And that, we believe, is typical of Baird's whole approach to high production machinery and tooling. For years, people have said "ASK BAIRD ABOUT IT" only because they know we will give them the right answer. Send in your inquiries, gentlemen — we're never too busy to help.

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS ON THESE ESSENTIAL PRODUCTION PROBLEMS:

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL-FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

Save MACHINE DOWN-TIME



WITH Beaver QUICK-CHANGE TOOLING PRE-SET AT THE BENCH

Beaver Quick-Change Arbors for all slotting, face, straddle, and gang milling save machine time, improve quality, and hold accuracy on single, multiple, and transfer machine operations.

By using Beaver Quick-Change Arbors in Beaver Quick-Change Holders on your machines, down-time can be confined to the bench. This allows uninterrupted machine operation without costly reset-ups with each change of tools.

Beaver Quick-Change Arbors reduce trial and error rejects by holding a constant relationship between the flange and the collar of the arbor. Spacing of cutters can be accurately predetermined at the bench with simple "Jo" blocks or height gage and indicator.

With Beaver Quick-Change Arbors your machines are free of costly down-time and cutter change from one set-up to another is a simple, quick operation. Prove Beaver Quick-Change Toolings superiority on your own operations.

STANDARD MACHINE TOOL ACCESSORIES CARRIED IN STOCK

Beaver TOOL AND ENGINEERING CORPORATION

BOX 429, ROYAL OAK, MICH., Teletype—Big Beaver 643

116 parts an hour with 7-unit trunnion machine

Efficiency, economy and speed in producing torque converter housing adapter plates is the key word of a large automotive manufacturer.

Specifically designed to do this job is the Baush 2-Way Horizontal Mechanical Machine illustrated which meets J. I. C. Standards.

Each of the 7 mechanical leadscrew units has a 24" stroke with a total of 47 spindles. Trunnion fixture has 5 holding units and guide bushings for tools. Fixture operates hydraulically to drill, rough and finish bore, finish ream, countersink, chamfer and tap 116 Plate Torque Converter Housing Adapters per hour at 100% efficiency.

KNOW YOUR COSTS — TAKE GUESSWORK OUT OF MACHINE REPLACEMENT. Check every 10 year old machine for direct labor, down time, maintenance, production! Competition demands the best ideas in automatic equipment for high speed and low costs.

WHY NOT CONSIDER
BAUSH AUTOMATIC EQUIPMENT FOR YOUR JOB?

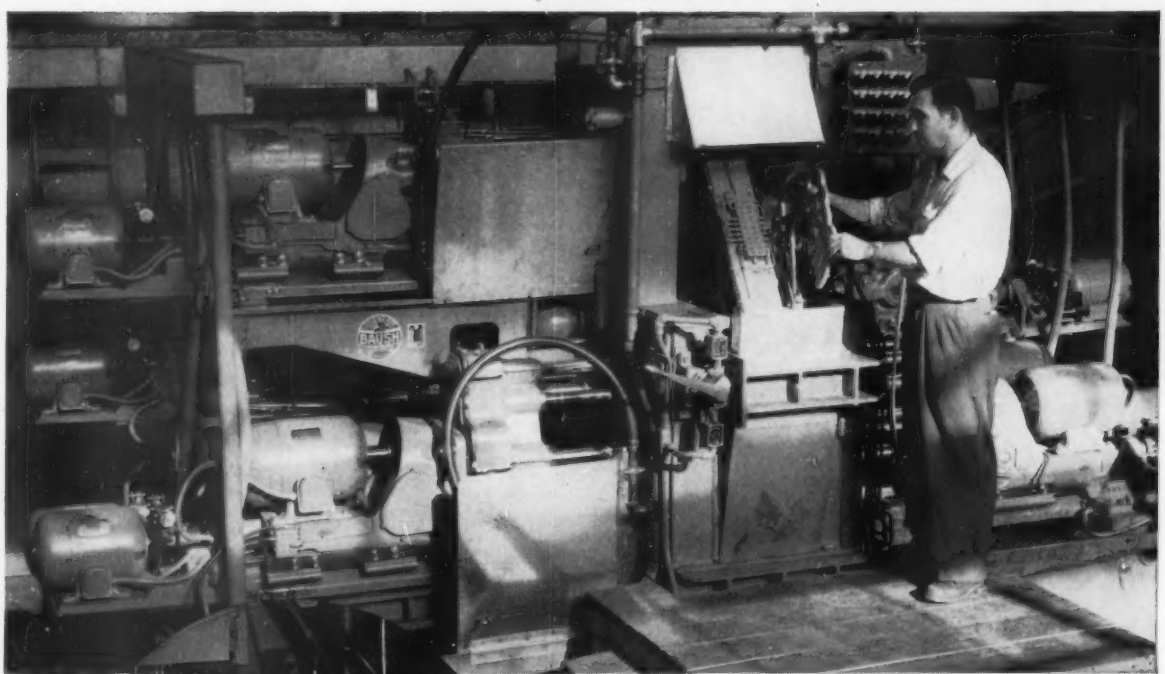
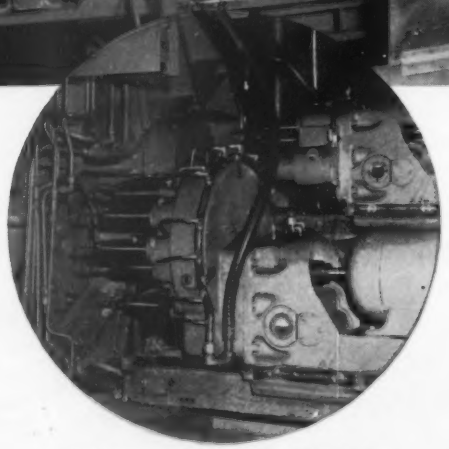
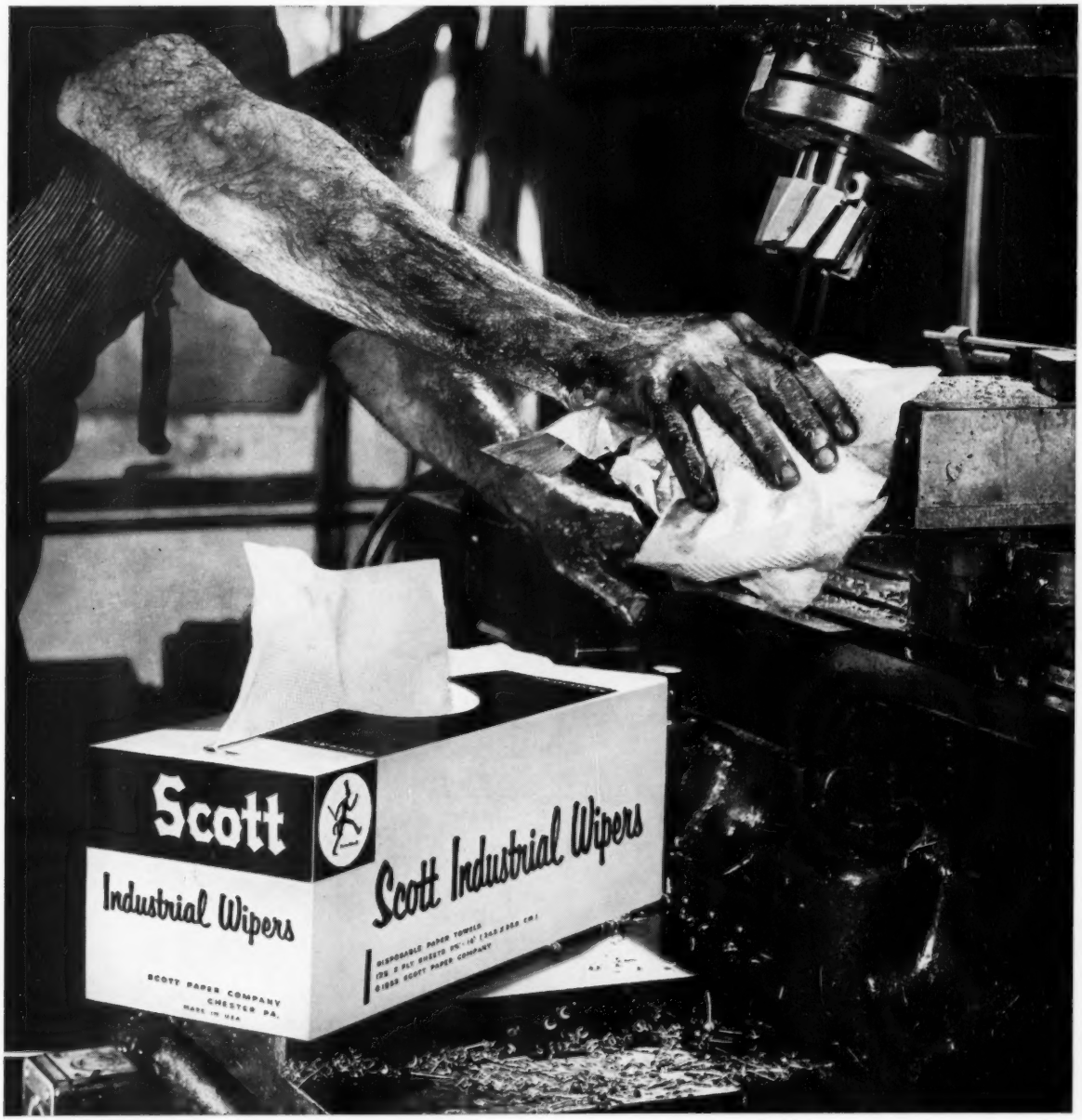


Plate Torque Converter Housing Adapter being set into holding unit on Baush 7-Unit Trunnion Machine.



Showing one of the 7 mechanical leadscrew units ready for drilling operation.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS



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We believe that the hands of America's workers are industry's most important tools. For this reason we are proud to introduce the **Scott Industrial Wiper,*** which is successfully meeting the wide range of wiping needs in industry. It is a general-purpose, disposable wiper designed to handle your jobs safely, efficiently and economically. A Scott man stands ready to demonstrate this product in your plant.

*PAT. PEND.

SCOTT PAPER COMPANY CHESTER, PENNSYLVANIA

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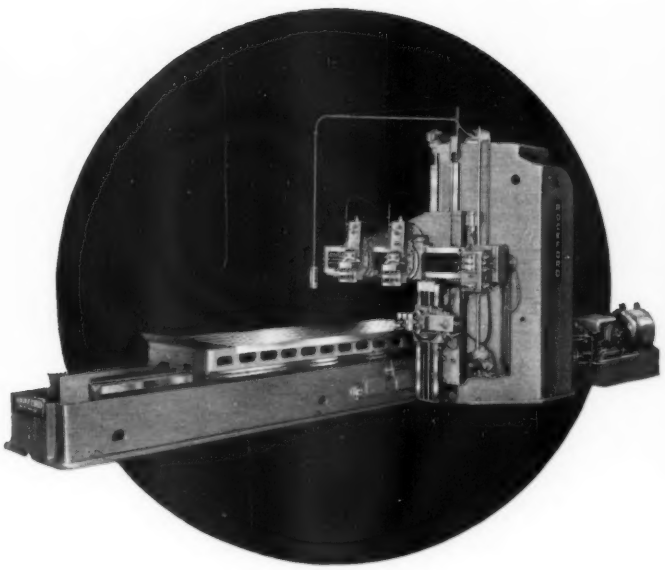
CHECK-POINT OF MAXIMUM INVESTMENT RETURN

Rockford Machine Tool Co.

reciprocating machine tools

Hydraulic Drive and Feeds, as basic features in modern machine tool design, provide outstanding performance, measured in terms of work quality, high production and low operating cost. We have had over 25 years of experience in applying Hydraulic Drives and Feeds to Shapers, Planers and Slotters.



rockford hydraulic planers

Rockford Hydraulic Planers are designed and built for greater precision, heavier cuts and the use of new types of alloy and carbide cutting tools.

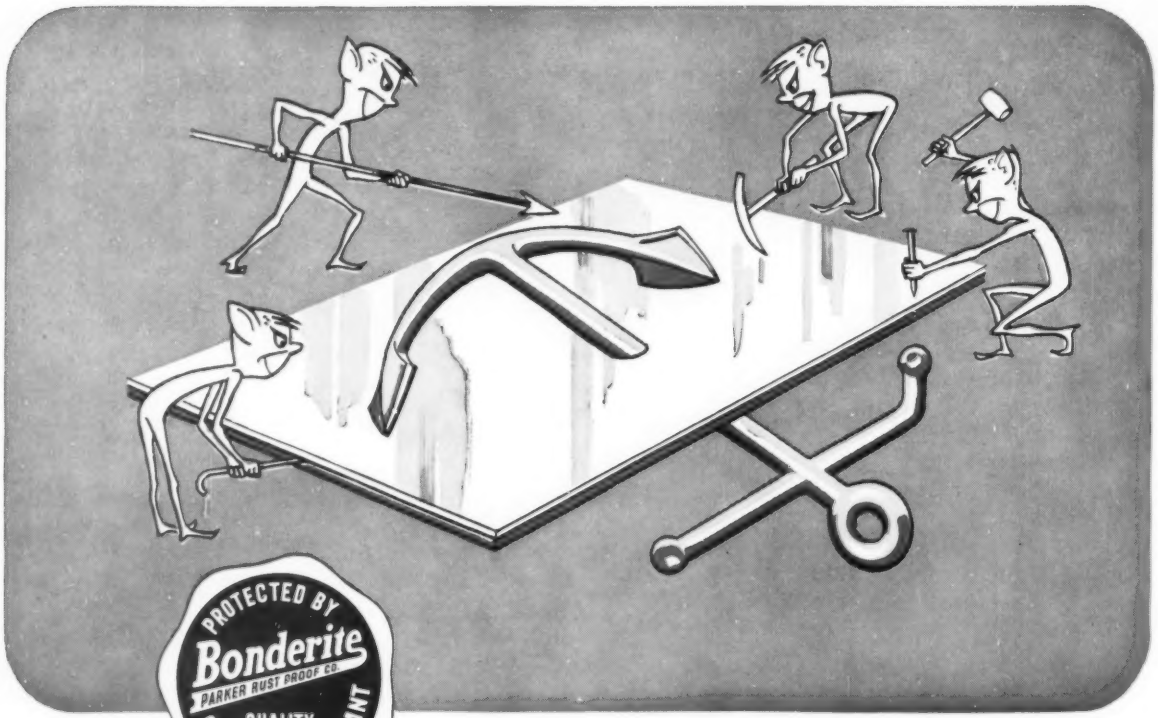
Table, bed and column are designed to withstand heavier cutting pressures. Column, with six-foot cross section and increased bearing on bed, assures accuracy,

Exclusive L-type cross-rail construction affords maximum bearing on column with resulting rigidity. Adjustable side-head rail assures accurate and permanent alignment of side head with rail heads.

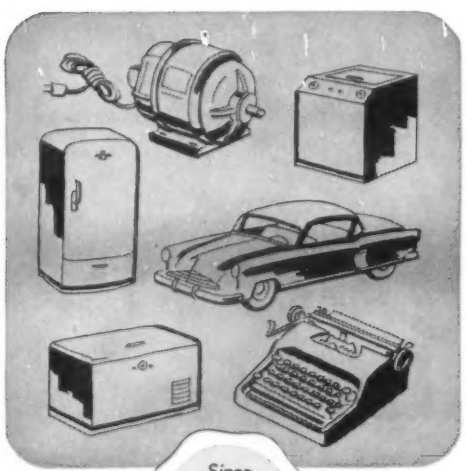
shaping / planing / duplicating / turning

our 52nd year

Rockford, Illinois



Anchors paint to metal!



Since 1915—leader in the field

● Even the best paint needs help to stick to metal surfaces. It needs Bonderite to supply a secure anchor.

Bonderite creates a nonmetallic phosphate coating integral with metal surfaces. This coating provides a lasting bond between paint and metal. Because it is nonmetallic, it resists corrosion, preventing moisture penetration and peeling, confining finish damage through scratch or bump to the site of the paint film break.

Bonderite, standard corrosion resistant paint base treatment throughout the world, makes it possible for paint to perform its functions of protection and fine appearance through years of hard service.

Your products should have Bonderite under the paint. Get the facts on Bonderite's efficiency, economy and dependability. Write today!

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

Parker RUST PROOF COMPANY
2196 E. Milwaukee, Detroit 11, Michigan

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces

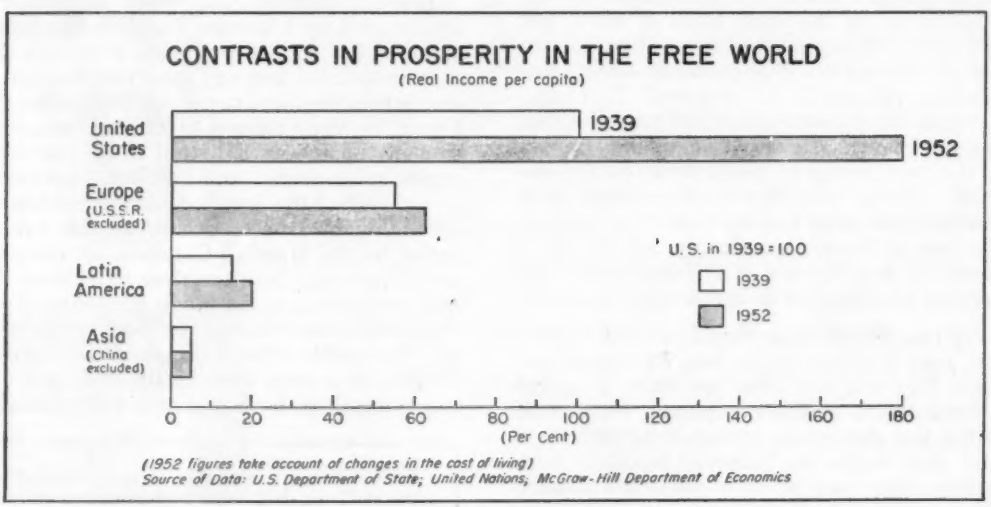
Contrasts in Prosperity Endanger the Free World

The chart in the middle of this page summarizes a situation of profound importance to every American. It shows that:

1. On the average, Americans are vastly better off economically than most other people in the free world, and
2. In recent years the gap in income between the average American and the average European, Latin American or Asian has greatly widened.

A Mounting Contrast

Even greater is the contrast between the real incomes of Asians and Americans. Today most Asians are no better off economically than they were back in 1939. On the other hand, the real income of the average American has almost doubled. As a result, the real income of the average Asian—always small by our standards—is now only a tiny fraction of that of Americans.



The chart shows that, at the outbreak of World War II, the real income (that is, actual purchasing power of income) of the average American was substantially higher than the average European's and much higher than the average Latin American's or Asian's. Since then, the European and Latin American have become better off. But the improvement in the economic lot of the average American has been so great that the others have been left far, far behind.

It must be remembered that the figures used to construct the chart are of varying quality. The fact is that few of the poorer countries have reliable statistics. However, it is generally agreed among competent observers, that the figures here presented offer a correct impression of the wide disparity in the average of real incomes between various parts of the free world. The figures, of course, have nothing decisive to say about spiritual and cultural values. In these, coun-

tries with relatively little material prosperity may be rich.

It is possible to draw a variety of morals from the story of lagging growth of income in other parts of the world. For one thing, it reflects the dynamic force of private enterprise. Private enterprise is characteristic of our economy far more than it is of most of the other free economies. The chart also reflects the fact that we are bountifully blessed with the natural resources essential to a high level of real income. Moreover, we did not suffer from the devastation and waste of two world wars as did many of the other free nations.

Narrowing the Gap

But perhaps the most important message which the chart conveys is one of warning. It warns that something must be done to narrow the gap in prosperity between America and other parts of the free world, if that world is to be united successfully in the struggle against totalitarian Communism. Writing in the HARVARD BUSINESS REVIEW, Kenneth E. Boulding recently put it this way:

> *"The crux of the problem is how to raise the three-quarters of the world that live on a low level to the high level of the other quarter, for it is precisely this wide disparity that makes our world so unstable. American-Russian relations, for instance [are] . . . complicated almost unbearably by the fact that each power is competing for the support of the vast fringe of underdeveloped countries . . . These countries are dissatisfied with their present state and are hovering between the two cultures, wondering which offers them the best chance of shifting from their present low-level to a high-level economy."*

Very real danger threatens from any feeling which may develop in the less fortunate free nations that our enviable economic progress has been made at their expense. Instead of viewing the American economic system as a model that might be followed by their own countries, they may be led to see in it a menace to their well-being. If Communist propaganda can persuade these people that their alliance with the free world will only result in their dropping farther and farther behind an increasingly prosperous United States, they will be driven to the side of totalitarianism.

Test of Effective Leadership

How can these free nations on the lower half of the income ladder be helped to alleviate the conditions that keep them there? Surely this question poses a whole series of complicated problems. Yet, if we do not exercise some effective leadership toward their solution, we can be sure that Russia will take advantage of the situation. In these circumstances, it is essential to both the stability and security of the free world that we help our less prosperous neighbors make satisfactory headway.

This does *not* mean that the United States should sacrifice its own economic progress in favor of some sort of global leveling scheme. On the contrary, a continually expanding and stronger economy is essential if we are to provide any real aid to our friends. Also, it goes without saying that our friends must be disposed to do all they can to improve their own economic position, if our cooperation to that end is to be effective.

Great Skill Required

Our part in a program to achieve this goal calls for a high degree of skill and statecraft. It involves international trade policy, which, in itself, presents a perplexing range of problems. It involves also programs of foreign technical and economic assistance. And expanded foreign investment must play a key role in a balanced program to strengthen the economies of the free world for our common good.

The Commission on Foreign Economic Policy, headed by Clarence Randall, has recently submitted a report, embodying the results of a monumental inquiry into our foreign economic relations and measures to improve them. From the very nature of the subject, discussion of the report is bound to be attended by much controversy and conflict. However, an awareness of the facts presented by this chart should inspire us to accord to the problems posed by the Randall Commission the careful and sober consideration they must have if any real progress is to be made in raising the general standards of human well-being throughout the free world. Our willingness and ability to do this have now become the real test of our statesmanship, both at home and abroad.

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As true as the deadly thrust of the cobra — Bath Taps bite into metal with the precision that comes only from proper pitch diameter, lead and angle.

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It means dependability on long runs . . . performance that is beyond the standard required by inspection . . . freedom from costly production delays.

Accuracy is a built-in Bath Tap feature. It begins with engineering design and is maintained by quality control throughout all the steps of manufacture.

In this age of mass production, down-time is costly. Un-interrupted assembly line operation requires consistently accurate measurement—an inherent quality of stock and custom built Bath Taps.

Let us put you in touch with a Bath representative or, write us direct for technical advice on your tapping problems.

Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

Insist on BATH TAPS for BETTER THREADS

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PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

13 Key Moore Tools help put the PRECISION in Harig Dies

KARL HARIG

"When owner-management invests its money in machinery," says Karl Harig, founder and president of Harig Manufacturing Corporation, "it does so only after a thorough analysis and careful selection of available equipment." So it's significant that Harig, one of America's foremost producers of carbide, lamination, progressive, stamping and other types of precision dies, employs 13 Moore precision-built machine tools for many of its most critical toolroom operations.

A trip through Harig's modern Chicago plant reveals:

3 MOORE JIG BORERS, for accurate locating and boring of holes in a fraction of the time required by other means;

6 MOORE JIG GRINDERS, for relocating and grinding of holes and contours—within tenths—after hardening;

3 MOORE PANTO-CRUSH WHEEL DRESSERS, for speedy, cost-cutting performance of both crush-forming and diamond-dressing on the wheel spindle of a surface grinder;

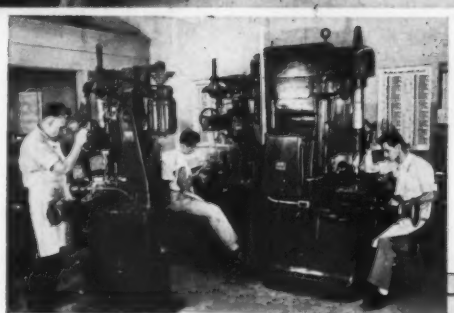
1 MOORE DIE FLIPPER, for "mechanized" die tryouts and assembly.

The combination of Harig craftsmanship and Moore precision tools has been an important factor in Harig's successful effort to meet continuing demands for faster production of intricate dies, tools, jigs, fixtures and gauges.

Why not discover how Moore tools can bring more speed and greater accuracy to *your* toolroom. Write today for our detailed literature.

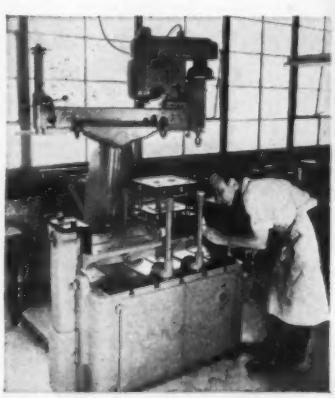
Moore Special Tool Company, Inc.
738 Union Avenue, Bridgeport 7, Connecticut

A battery of six Moore Jig Grinders performs precision internal and contour grinding operations on sectional die parts at the Harig plant.



Three rugged Moore Jig Borers handle the bulk of Harig's critical spotting, drilling, boring and reaming operations.

Harig uses this Moore Panto-Crush Wheel Dresser on a surface grinder for fast pantograph profile grinding. Harig also has two more of these cost-cutting units.



A Moore Die Flipper facilitates accurate die tryouts and assembly at Harig, replaces time-consuming hand-labor methods.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

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STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Soluble Oil

TOOL Precision grinder

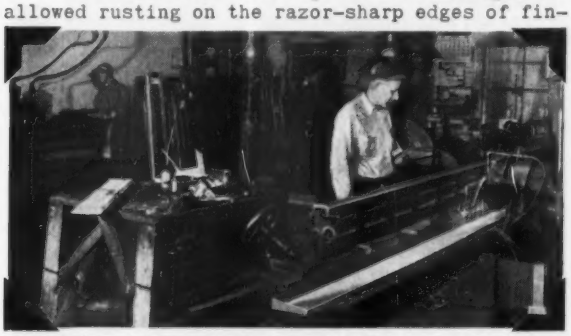
LUBRICATOR Circulating flow onto work

SERVICE Grinding paper-cutting knives

FIRM Sharpe & Company, Los Angeles

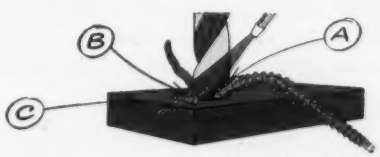
Highly stable oil ends separation and rust problem!

CALOL SOLUBLE OIL was the answer to many problems on this precision grinder, used by Sharpe & Co., Los Angeles, for sharpening paper-cutting knives. Other oils tried turned rancid, separated in storage, and allowed rusting on the razor-sharp edges of finished blades. But when a mixture of only one part Calol Soluble Oil to 63 parts water was used, it remained stable under all conditions, prevented rusting, and held deposits on grinding wheel to a minimum. (Above) Hand-honing blade after grinding.



SHARPENING HARD TOOL-STEEL KNIVES for paper-cutting machines all over the West, Sharpe & Co. has used Calol Soluble Oil for more than three years. Owner Eldon Buntin says, "We have had no trouble of any kind since using Calol Soluble Oil. It doesn't separate or permit rusting like other oils we've tried and has never produced a bad odor."

How to up efficiency in all metal-cutting operations



Use the correct Calol Cutting Fluid for any operation from grinding to broaching. Recommendations for each are made from actual working results.

A. Have high cooling and lubricating qualities—minimize "built-up edge" and promote good finish.

B. Flush away cuttings readily.

C. Protect machine and work against rusting and corrosion.

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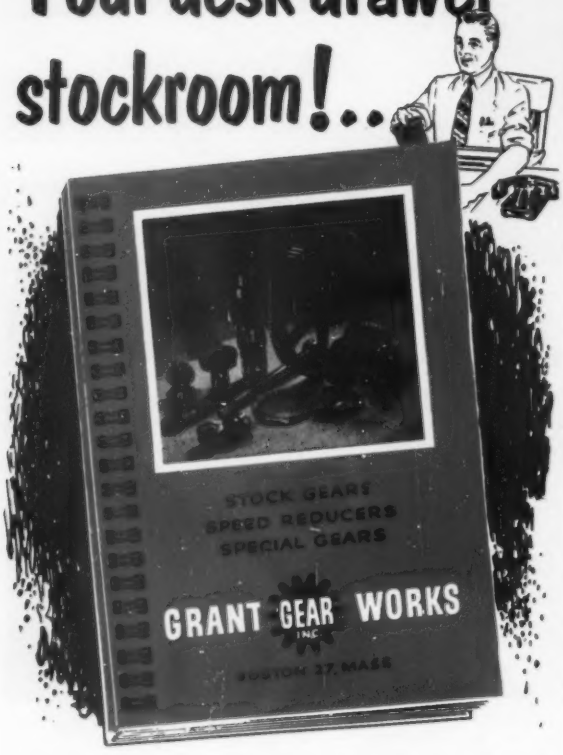

Yes, you can keep your stock of gears right in your desk drawer. It's simple with the new Grant catalog. There's no need of *carrying* a large inventory of gears *on hand* when you can find what you need at Grant—with delivery made to fit your schedule.

Whether it's gears, sprockets, or speed reducers, you'll find what you need in this new catalog. Better get a copy for your desk drawer now.

Custom Gears?

You can depend on over three-quarters of a century of Grant experience to produce custom gears to your specifications.

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Extra CLEARANCE
Extra SPEED

Rugged construction—drop forgings, cast steel and solid bar stock.

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Wolverine Toggle Clamps also available in several types and sizes of Standard Action and Push Action units.

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Wolverine Clamps are in use in almost every major industrial field and are specified by prominent engineering firms. Write for Bulletin.

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Eliminate costly customer complaints. Test hardness at various manufacturing stages with a WILSON *"Rockwell"* Hardness Tester. Benefit by the long experience of WILSON'S Standardizing Laboratory. A genuine *"Rockwell"* tester pays for itself.

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There are two types of WILSON *"Rockwell"* Hardness Testers... Regular and Superficial. They come in many styles with accessories for testing flats, rods, rounds, and odd shapes. For micro-indentation hardness testing, there is the WILSON TUKON.

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WILSON "ROCKWELL" and TUKON Hardness Testers

THIS SUPER Seal

(EXCLUSIVE IN SEALMASTER BEARINGS)

obsoletes old ideas on bearing maintenance costs

IT KEEPS dirt out AND grease in!

When dirt gets into bearings or grease leaks out, you've got trouble . . . high maintenance and replacement costs and all-too-frequent disassembly and downtime for machines.

Permanently Sealed SEALMASTER Bearings Were Developed to Lick This Problem

HERE'S WHY: In SEALMASTER Bearings, grooved, steel inner seals—permanently mounted on the outer race ring, one on each side, form the grease chamber.

Two annular felt-lined flingers rotating with the inner race ring and within the grooves of the inner seals, form the outer seals. The centrifugal action of these flingers effectively seals out all dirt. The bottom flanges of these rotating flingers, passing under and slightly beyond the inner seals, create a vortex action in the grease chamber. This breaks up the grease flow and retains just the right amount of grease to lubricate.

Whether your problem is dirt or simply making sure the bearings in the machines you make or use will give maximum service, SEALMASTER Bearings can help *you*. They are first class assurance of low maintenance costs and long bearing life! Write for Bulletin No. 845.

SEALMASTER
BALL BEARING UNITS

Cartridge Unit | Flange-Cartridge Unit | Flange Unit | Take-Up Unit | Pillow-Block Unit

SEALMASTER BEARINGS
16 Ridgeway Avenue, Aurora, Illinois
A DIVISION OF STEPHENS-ADAMSON MFG. COMPANY

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GEARS
Always Meet the Specifications

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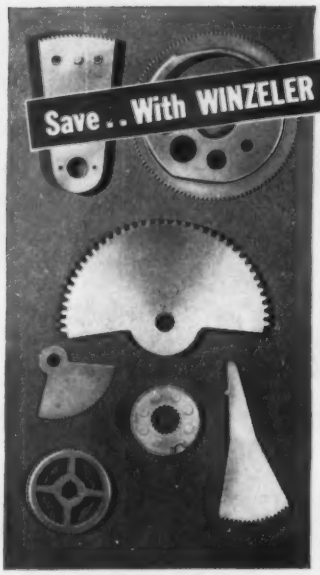

Save . . With WINZELER Stamped Gears . .

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WRITE FOR FREE *4-page catalog-folder describing our facilities and the various Stamped Gears, Tools and Assemblies we make. Valuable gear data and tables are included. Or, get ideas, samples and low cost estimates. No obligation.*

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YOU WRITE THE SPECIFICATIONS

Our job is to furnish Adams Gears exactly as you want them. Highest quality is assured through close control over every detail of manufacture. The Adams Company, 1942 Cypress Street, Dubuque, Iowa.

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BEVEL AND	(Spur and Helical)	GEARS
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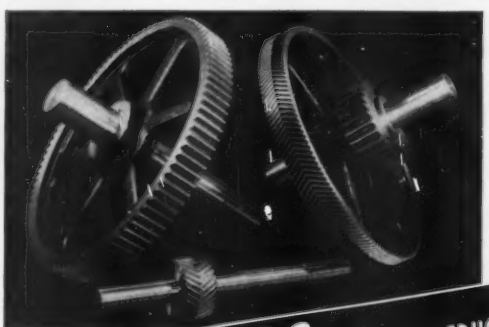
GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS



GEARS FOR SPEED REDUCERS

Illustrated are speed reducer assembly table gears for use in rolling mill machinery. Made right, of the finest materials, these gears give meaning to Stahl's long-standing reputation for producing gears to exact specification—economically and on time. Get Stahl's estimate first!

SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
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RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FIBROIL
HEAT-TREATED, CASE OR FLAME HARDENED GEARS — OF CARBON OR ALLOY STEEL

Stahl
GEAR & MACHINE COMPANY
3901 Hamilton Ave. Cleveland 14, Ohio

"Low Maintenance Led Us to Standardize on Clark Electrics,"

SAYS DAVID MacGREGOR, WORKS MANAGER, EDWARD VALVES, INC., EAST CHICAGO, IND. — Subsidiary of ROCKWELL MANUFACTURING CO.

"Our Clark electric 4000-lb. Carloaders have established a low maintenance record so impressive that we decided to standardize on Clarks," says Mr. MacGregor. "We operate nine machines, the first one purchased in '42. They are all the same model—our spare parts inventory is no problem. We get prompt, competent service when we need it—from the Clark dealer or from the factory."

Do you operate fork trucks? . . . or should you?—one, a dozen, a score? Look into the sound economics of Standardizing on Clarks:

- **low maintenance—designed and built to require a minimum of attention**
- **balanced design—all essential features combined with emphasis on stability, ruggedness, safety**
- **complete line—electrics, gas-powered; a right type and size**
- **able counsel to help *engineer* an efficient handling system**

Sensible Step 1 toward a solution of your materials handling problem is to consult the Clark dealer — look in the Yellow Pages of your phone book.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 3, Michigan

now you have

the **GREEN LIGHT**

on faster production

more accurate work

better quality work

with these **HORIZONTAL** and **VERTICAL**

BROACHING MACHINES

BOTH EQUIPPED WITH

ELECTRO-MECHANICAL DRIVE

They represent the most advanced engineering in many years, in the field of BROACHING

BROACHING SPEEDS -

High Speed

LAPOINTE

Single Ram Horizontal Electric Drive BROACHING MACHINE

Special details of the LAPOINTE electric drive HORIZONTAL BROACHING MACHINE

Optional: Dual Speed and Dual Cycle (Patented).

Two slide widths, 16" and 24".

Strokes up to 180".

Here are the outstanding features of *both* machines, horizontal and vertical:

1. **Broaching speeds up to 300 feet-per-minute, *and more.***
2. **Amazing smoothness of operation at high speeds.**
3. **Electro-mechanical drive.**
4. **Exceptionally heavy, rigid construction minimizes chatter and *increases tool life as much as 2 to 5 times!***
5. **Variable speed at your fingertips.**
6. **Main driving gear is continuous-tooth herringbone type.**
7. **Massive main slide rides on natural phenolic ways.**
8. **Saves down-time caused by excessive tool change-overs.**
9. **Easy to load and unload.**
10. **Unusual versatility and flexibility.**
11. **Simplicity of maintenance.**

Bulletins are available describing both these machines. Ask for "Electric Drive Bulletins No. 2".

— up to 300 fpm and more!

Yes, they're really fast! *What's more, these electric-drive machines give you a smoothness of operation never before attained in broaching. The natural result is more accurate, better quality work.*

Here's a thought: Don't judge a machine by **rated capacity** alone . . . judge it by its **output!**

A machine may be **rated** at so-many-parts per hour but what is its actual output per shift?

In other words, how much does **down-time** affect your total production?

That's where **tool life** comes in! By increasing your tool life as much as **200% to 500% between grinds** your machine is actually giving you **many more productive** hours by **saving the difference in down-time** represented by tool changeovers.

(Photo taken during assembly)
Completely new LAPOINTE Double Ram Vertical Electric Drive BROACHING MACHINE

Special details of the LAPOINTE electric drive VERTICAL BROACHING MACHINE.

Double ram for high production. Slides are unusually heavy. Strokes available from 66" to 108".

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

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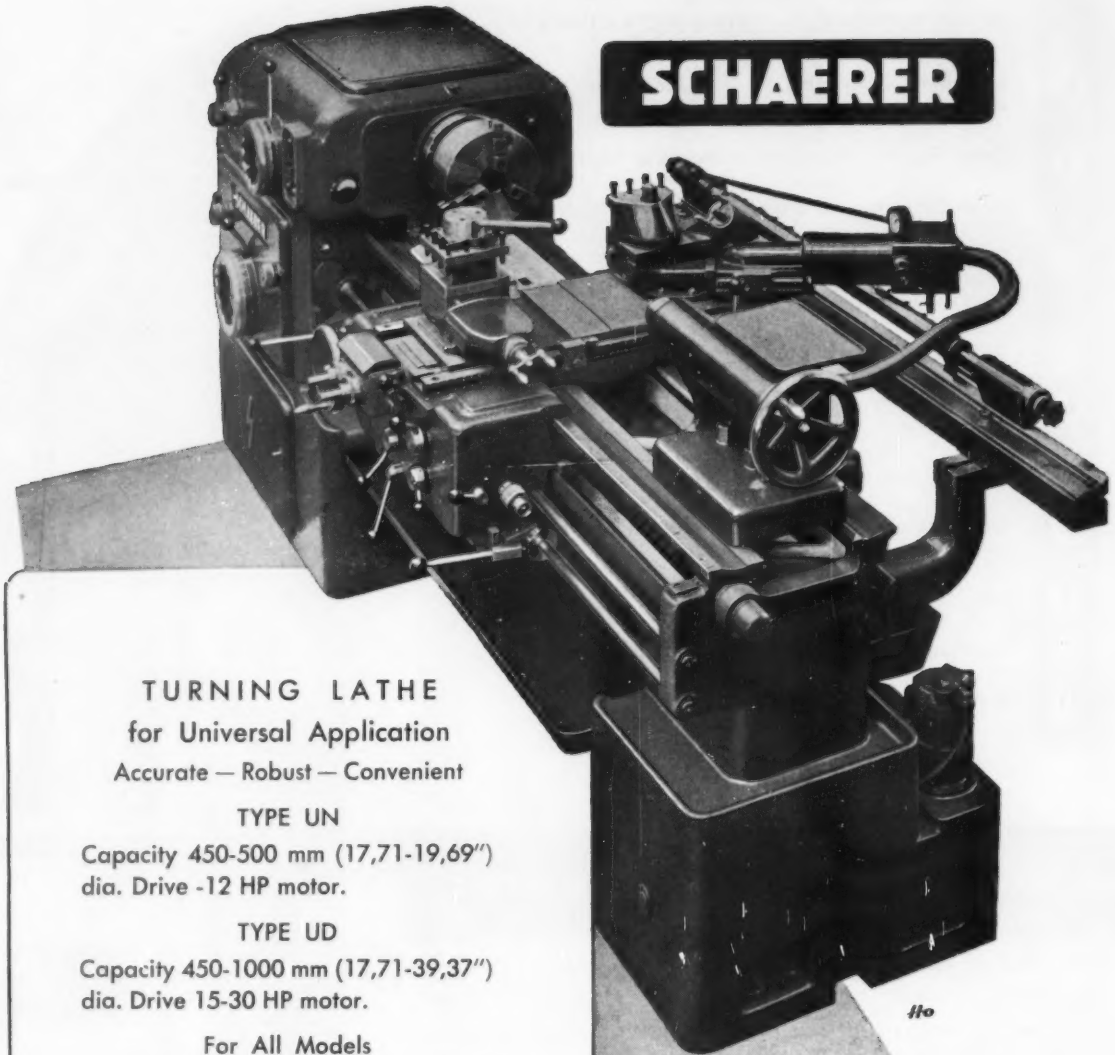

TURNING LATHE
for Universal Application
Accurate — Robust — Convenient

TYPE UN
Capacity 450-500 mm (17,71-19,69″)
dia. Drive -12 HP motor.

TYPE UD
Capacity 450-1000 mm (17,71-39,37″)
dia. Drive 15-30 HP motor.

For All Models
SCHAERER Hydraulic Copying
Attachment

Please ask for our detailed
DB Literature

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ANNOUNCING THE NEW MAXITORQ "DISC-PAC"

A "DO-IT-YOURSELF" UNIT
FOR BUILDING YOUR OWN CLUTCH

Due to a growing demand for Maxitorq Floating Discs, we now introduce The *MAXITORQ DISC-PAC* . . . a self-contained unit independent of the actuator.

Patented Maxitorq Separator Springs that prevent drag, abrasion, and consequent heating in neutral . . . and the Maxitorq Locking Plate which locks all discs onto body . . . give you the outstanding features that are so highly favored by machine and product designers.

Thus you may build your own clutch or brake from our standard stock Maxitorq parts. The Disc-Pac keys to your shaft and is easily replaced. Units are available in 8-disc diameters from 2" to 8"; ¼ to 15 h.p. at 100 r.p.m. . . . with 3 lugs on the smallest size, 8 lugs on the 3 h.p., and 12 lugs on the 5, 10 and 15 h.p. capacities.

The Disc-Pac fits Maxitorq standard Driving Rings in the event that you want to use them. As with the Maxitorq Clutch, all assembly, take-apart and adjustments are manual . . . no tools required.

Write Dept. AM-2 for full specifications and quotations.

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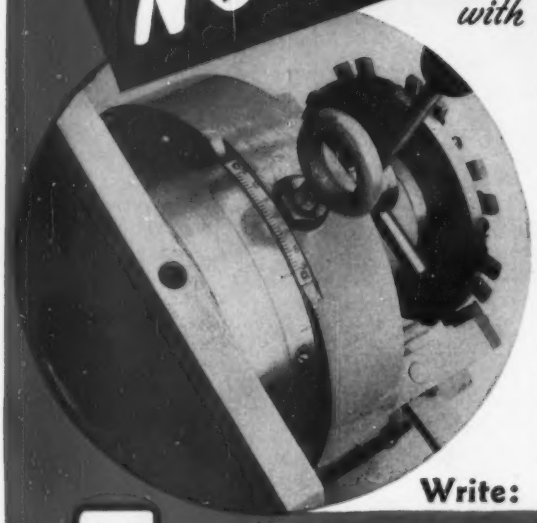
THE CARLYLE JOHNSON MACHINE COMPANY
MANCHESTER • CONNECTICUT

NOW RAPID · ACCURATE JIG POSITIONING



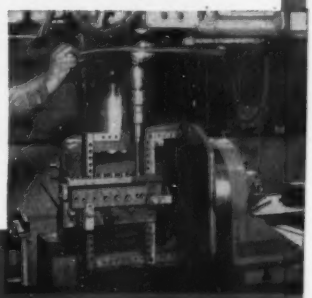
with **STURDY, VERSATILE J & B INDEXING TRUNNION**

24 Positive-Lock Stations Plus Station Selector and Vernier Attachment for Intermediate Positions.

The J & B Indexing Trunnion mounts readily on any table of your present drilling, planing, milling, or boring machines.

Once there, this versatile, rugged time-saver solidly holds either workpiece or jig. Rotation to the precise positions desired is then simple, fast, and thanks to the station selector, without error.

EXTRA SAVINGS in time and money: You can use simpler, more efficient jigs, reduce set-up and positioning time, and save wear and tear on both machine table and jigs with J & B Indexing Trunnions.



Typical Time-Saving Application. More table-mounting feature and close-ups of jig

Write:

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PRODUCTION TOOL DIVISION

WORCESTER, MASSACHUSETTS

ESTABLISHED 1870

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Clark ADJUSTABLE HOLE CUTTER

Finished cuts the first time in boiler plate, plastics, hard fibre, pipe, stainless steel, Transite, etc. 7 models cut variable expansions from ⅜" to 5" holes, with thickness capacities from thin sheets to 1".

SPECIFICATIONS			
MODEL NO.	SHANK SIZE	EXPANSION CAPACITY	THICKNESS CAPACITY
00	⅜" SS	⅜"—1¼"	⅛"
0	½" SS	½"—1½"	¼"
1	½" SS	1"—2½"	⅛"
2	2 MT	1½"—3"	½"
3	2 MT	2"—3½"	⅝"
4	4 MT	2½"—4"	¾"
5	4 MT	3"—5"	1"

For Complete Information Call Your Clark Cutter Jobber or Write Factory 6

CLARK Co CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BLVD · BEVERLY HILLS · CALIFORNIA

SMOOTH FLOWING POWER

WORCESTER Gear Racks

Complete Machining

Helical, Bevel, Spiral, Spur and Worm Gears. Sprockets, Worms, Ratchets and Gear Racks.

WORCESTER gear works, inc.

28 Grafton St., Worcester 8, Mass.

See E-82 in P.E. 1954 Handbook

ACCO products

CAMPBELL Abrasive Cutters

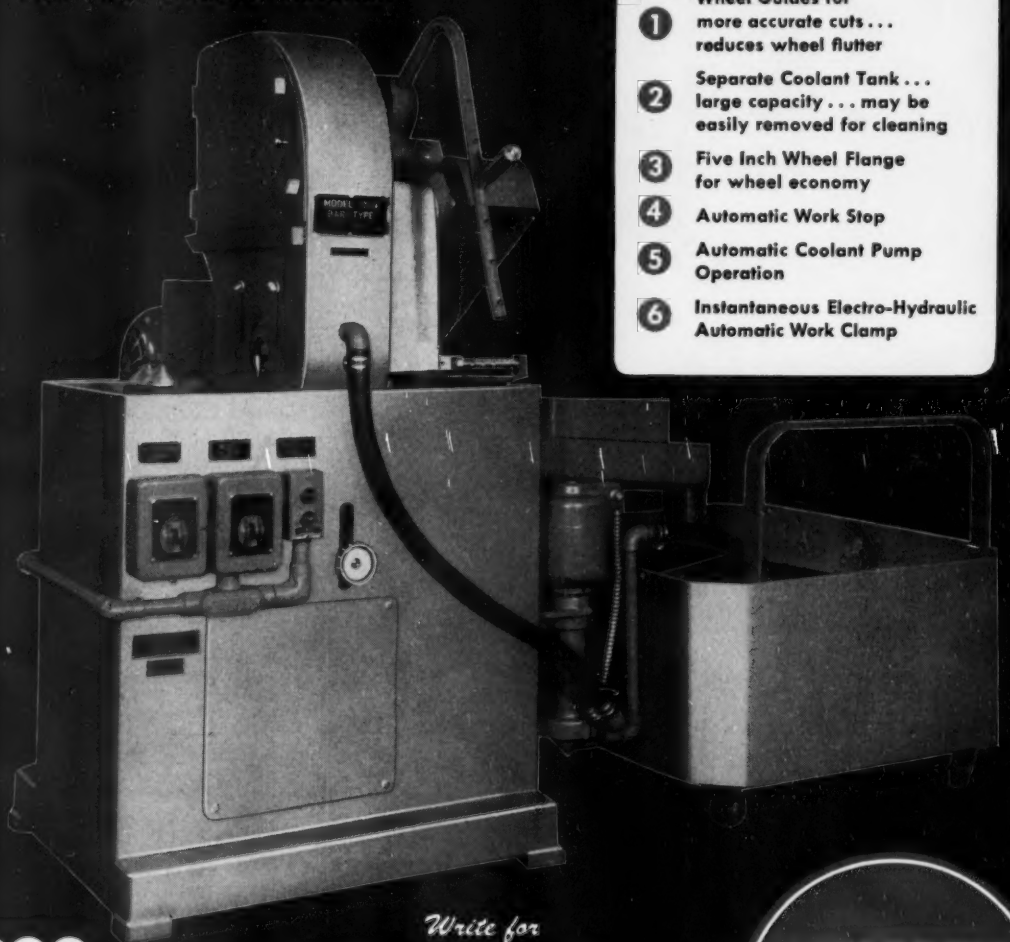
New... Low Cost

No. 223 Wet Abrasive Cutting Machine

Fast, clean, close tolerance cuts of hardest alloys and all other metals. Won't work-harden material.

FEATURES

1. Wheel Guides for more accurate cuts... reduces wheel flutter
2. Separate Coolant Tank... large capacity... may be easily removed for cleaning
3. Five Inch Wheel Flange for wheel economy
4. Automatic Work Stop
5. Automatic Coolant Pump Operation
6. Instantaneous Electro-Hydraulic Automatic Work Clamp



Write for "Principles of Abrasive Cutting"

ACCO

TRADE MARK

CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE

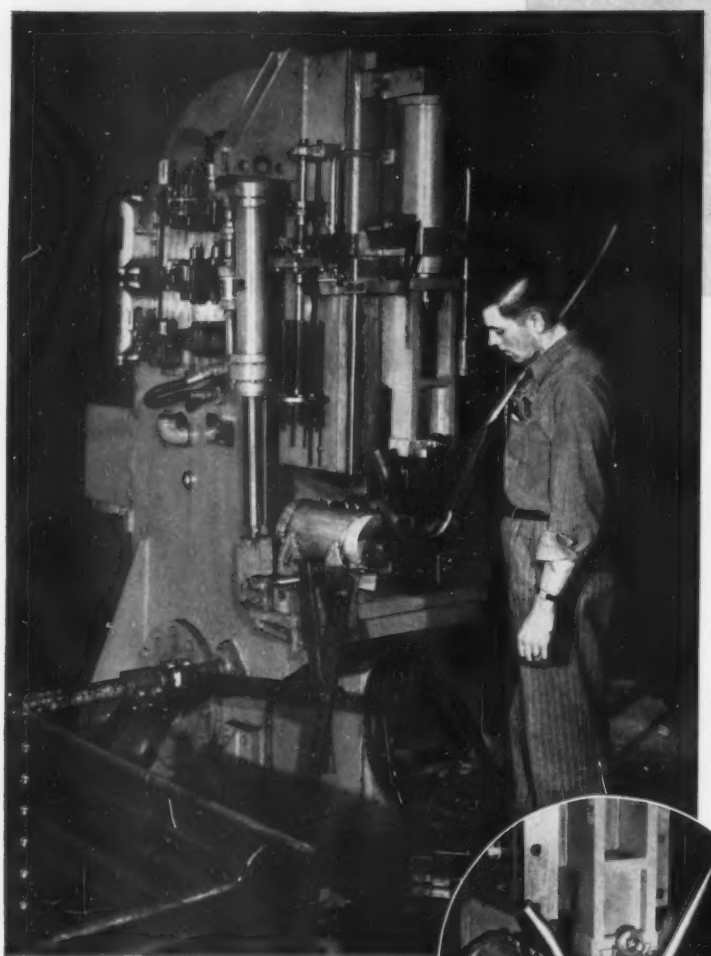
923 Connecticut Ave., Bridgeport 2, Conn.

CAMPBELL
Abrasive Cutters and Nibblers

New PINES 20-TON BENDING PRESS

PRODUCES AUTOMOTIVE EXHAUST PIPES

50% FASTER



▲ Production view of new Hydraulic Bending Press now producing, in a single setup and with one operator, 4 to 8 multiple bends on automotive exhaust and tailpipes at speeds from 600 to 800 bends per hour.

The new Pines 20-Ton Hydraulic Pipe and Tube Bending Press is now establishing new records of production efficiency on many different bending operations. For example, on automotive exhaust and tailpipes, multiple bends with 4″ and 6″ radii are now produced in 1-1/4″ to 2″ O.D. 16 ga.-18 ga. tubing at speeds ranging from 600 to over 800 bends per hour.

On an over-all basis, current results show these jobs are produced 50% faster than with ordinary bending press equipment. At the same time, because of the design of the Pines, savings up to 30% in setup time are effected. Further, because more jobs can be handled in a single setup, there's a substantial reduction in tooling expense. If you have work adaptable to a bending press, it will pay you to see Pines today.

◀ Closeup view of Pines Bending Press forming 4th bend in a 1⅝″ (16 ga.) CRS automotive exhaust pipe. Note how wing dies are controlled by side-mounted cushions through heavy crank arms. Interchangeable pick-off turret of angle-of-bend selector saves set-up time on repeat jobs.

CHECK THESE COST-CUTTING PRODUCTION FEATURES

- ✔ **Twin Equalizing Side-Mounted Cushions** — provide greater working clearance, maintain constant torque, reduce flattening and distortion.
- ✔ **Faster Cycling** — angle-of-bend selector indexes and resets to starting position automatically without indexing through idle stations, increases output.
- ✔ **Greater Work Handling Capacity** — extra clearance reduces number of setups on multiple bending, permits broader use of uniform radii, cuts tooling and production costs.
- ✔ **Interchangeable Pick-Off Turret** — for angle-of-bend control. Permits storing and remounting for repetitive jobs, reduces setup time.
- ✔ **Adjustable Ram Speed Control** — assures efficient operation, simplifies setups. Ram can be lowered slowly or stopped at any point.

WRITE FOR NEW 4-PAGE BULLETIN

Write today for free bulletin completely illustrating and describing the new Pines Bending Press and its cost-cutting production features.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery · 671 WALNUT · AURORA, ILLINOIS

PRODUCTION BENDING · DEBURRING · CHAMFERING MACHINERY

Here's new power for all standard and special motor applications

The Louis Allis Co. proudly presents the NEW L.A. *Line of electric motors*

Upper: New L.A. Fan-cooled and Explosion-proof Motor

New L.A. Open, Drip-proof Motor

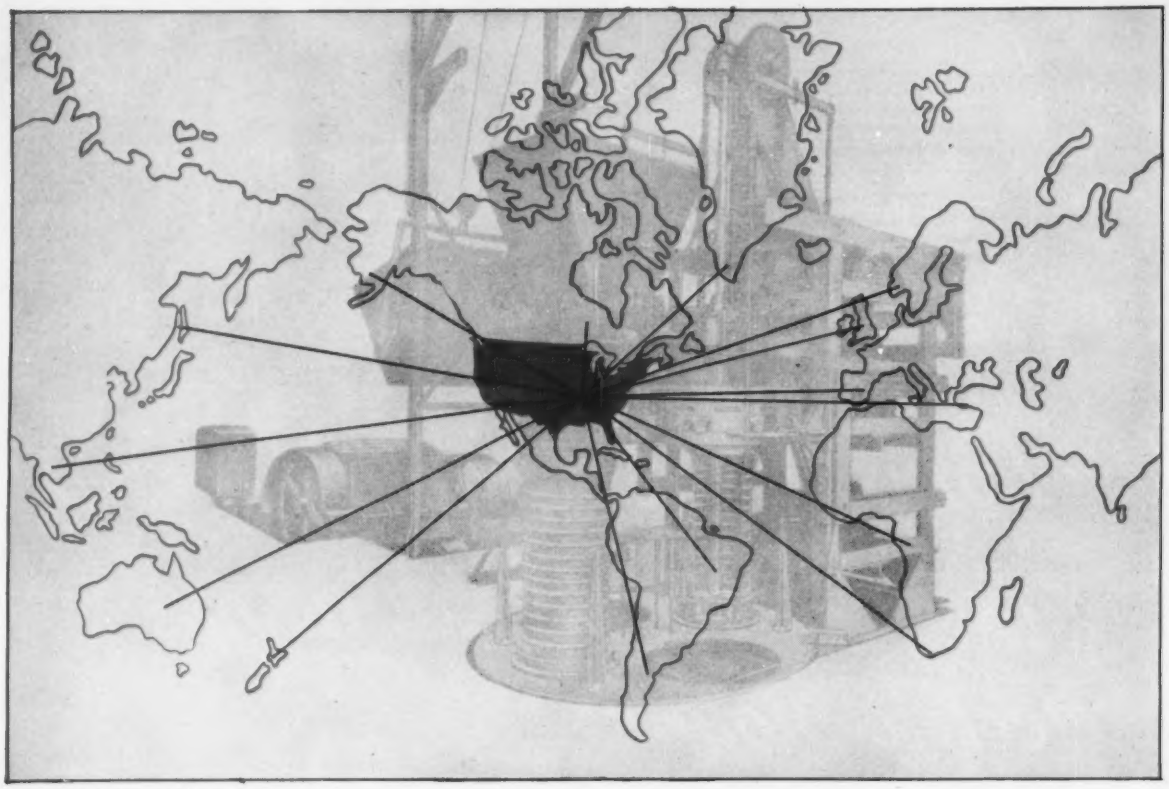
Here is complete utilization of more than 50 years of motor engineering and development—the new L.A. line of electric motors. More than just a "face-lifting" to meet the new NEMA standards, these motors are entirely new through and through—with such features as new modern styling . . . improved ventilation . . . greater motor protection . . . new conduit box arrangement . . . new bearing construction . . . and more versatile mounting.

Improvements in motor design, materials, and manufacturing methods make the new L.A. line possible. These motors pack more power in a smaller, lighter, more functional package. Yet they sacrifice none of the high Louis Allis standards of performance and liberal design.

Get the facts on the most modern motors available—the new L.A. line. Call in your nearby Louis Allis Sales Engineer today for the complete story.

Special Note *Louis Allis motors in old NEMA standard frame sizes will still be available if you require them for interchangeability or replacement.*

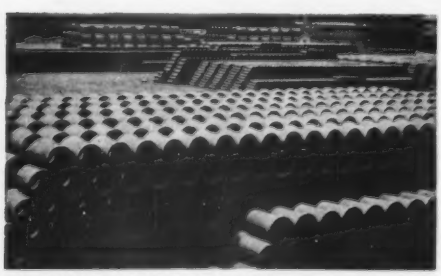
THE LOUIS ALLIS CO. • MILWAUKEE 7, WISCONSIN



From Sioux City, Iowa:

CITIES SERVICE OILS AND GREASES SENT ALL OVER THE WORLD WITH McCRACKEN MACHINES!

"OUR FINISHED MACHINES are completely serviced with Pacemaker 2 hydraulic fluid, Optimus 4 oil in the transmission and Trojan M for bearing grease."



CORRUGATED CONCRETE PIPES, used for sewer, culvert and irrigation work, are one of industry's most vital tools. McCracken Machines make the very finest.

ONE CITIES SERVICE PRODUCT SOLD MANUFACTURER ON THE COMPLETE CITIES SERVICE QUALITY LINE!

During the early part of World War II, Concrete Pipe Machinery Co., manufacturers of McCracken Machines, called in a Cities Service Lubrication Engineer for answers to some tough metal-cutting problems. On his recommendation, they tried Cities Service Cutting Oil, Chillo 93. Finished work was so improved and tool life so prolonged, that Concrete Pipe had a complete lubrication survey made of their plant.

THIS CAREFUL SURVEY PROVED THAT THE COMPLETE CITIES SERVICE LINE COULD DO THE BEST JOB FOR THEM. Electric motors, spindles, gear reducers, air compressors . . . drilling, grinding, machining of cast iron parts, threading, tool and die work . . . hydraulic systems, bearings, transmissions . . . Cities Service Industrial Oils, Greases and Cutting Oils did better on every job! Concrete Pipe Machinery Co. says: "They are giving us outstanding service, and availability and delivery have always been excellent."

If you'd like to talk to a Cities Service Lubrication Engineer, write Cities Service Oil Company, Sixty Wall Tower, New York 5, New York, or call the office nearest you.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

B SERIES • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Bronze ball retainer . . . 38 sizes ½" to 3½" I.D.

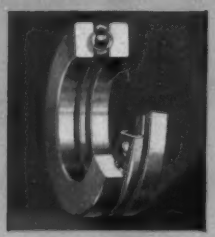
C SERIES • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Pressed steel retainer . . . 16 sizes ½" to 1⅞" I.D.

F SERIES • Light duty, one direction thrust bearing. Flat seat. Grooved races. Pressed steel retainer . . . 43 sizes ½" to 3½" I.D.

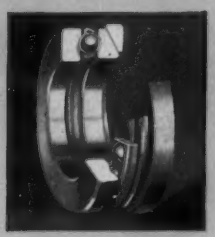
G SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 76 sizes ½" to 7⅜" I.D.

E SERIES • Medium duty ball thrust bearing. Banded. Flat seat. Grooved races. Full complement of balls . . . 40 sizes ½" to 3½" I.D.

1000 SERIES • Light duty ball thrust bearing. Flat seat. Grooved races. Pressed steel retainer. Metric standard . . . 26 sizes 10 to 125 mm. I.D.

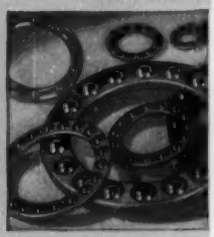


1100 SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.



1400 SERIES • Medium duty. Grooved races. Spherical seat. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

W SERIES • Case hardened and ground flat washers for various Thrust and Spacer applications. Slip fit. 38 sizes ½" to 3½" I.D.



R SERIES • Ball thrust retainer. One piece, pressed steel, channel type cage . . . 79 inch sizes 0.266" to 4.232" I.D.

Judged by every quality and performance standard Aetna bearings measure up to modern industry's increasingly exacting needs. That's why Aetna has a customer list that reads like Who's Who in American Industry—why 80% of Aetna's business comes from firms it has served for 20 or more years. Aetna has specialized on the advanced development, production and application of high precision anti-friction products for nearly four decades. Be sure to give this valuable background of experience your serious consideration when planning improvements of your present products or developing new ones for future production. We welcome your inquiry.

CLUTCH BEARINGS • Ball thrust clutch release bearing. Banded. Pre-lubricated. T-type, oil impregnated bronze retainer assures concentricity and smooth, quiet, long-life performance.

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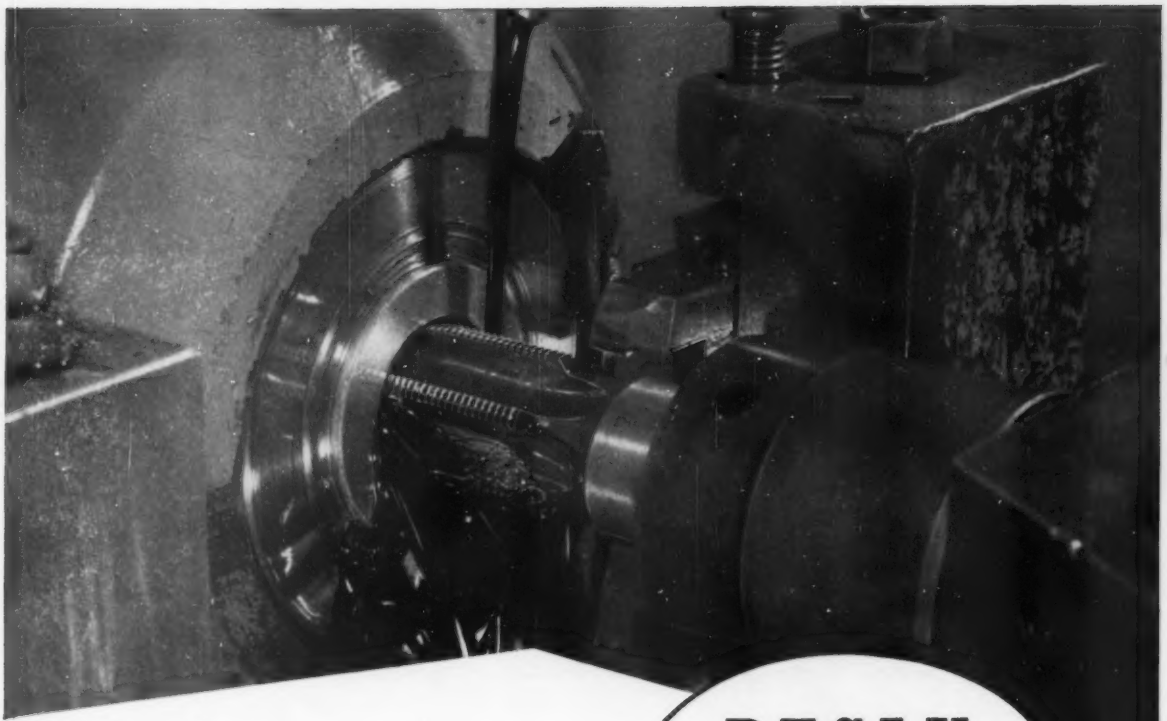
Precision Bearings and Parts for Every Branch of Industry

AETNA BALL AND ROLLER BEARING COMPANY
4600 SCHUBERT AVENUE
CHICAGO 39, ILLINOIS

SPECIAL BEARINGS • Facilities for sizes up to 38" O.D. Counsel that brings you the expert technical aid that has licked many of industry's toughest bearing application problems.

PRECISION PARTS • Aetna is versatile—can mass-produce vital parts in almost limitless sizes and shapes—to your most exacting metallurgical, tolerance and finish specifications.

Write **for latest catalog. Contains specifications on Aetna's complete line—vital technical reference data on bearing selection, load capacities, lubrication, care and maintenance.**



Doing a Tough Job Well for The Chicago Screw Company

BESLY TAPS

HERE you see a C-1018 high carbon steel nut being threaded by a Besly 1¾" —12 tap. Highly abrasive because it has been carburized and heat treated, the material is hard on taps. For this reason, The Chicago Screw Company chose Besly Taps . . . the line of taps that *has proven* it can "take it" on the toughest of jobs.

LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs on *your* tough jobs. Ask us or your authorized Besly distributor for a FREE TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".

UNSURPASSED ACCURACY AT EVERY VITAL POINT

- Microcentric CHAMFER
- Solid-Ground THREAD FORM
- Accurate RAKE ANGLE
- Mirror-finish FLUTES
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TAP TIPS The handy "Handbook for Tap Users" is full of information on tapping methods and tap selection. WRITE FOR YOUR FREE COPY.

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Established as Charles H. Besly and Company in 1875
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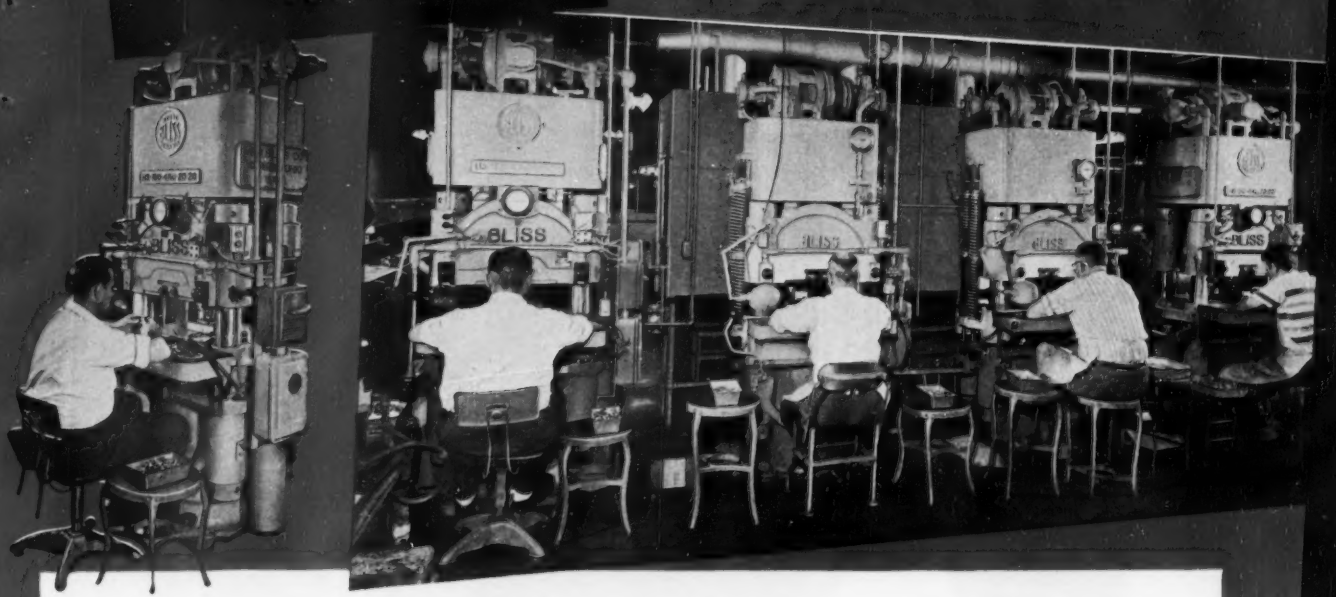
BESLY Drills, Reamers and End Mills . . . High Speed Cutting Tools in a complete range of types and sizes.

For HYDRAULIC presses, too . . .
it pays to specify BLISS



Gruen obtains MICRO-PRECISION accuracy with

BLISS HYDRO-DYNAMIC PRESSES

Accuracy is the keynote of operations at the Gruen National Watch Case Company, Cincinnati, Ohio. This is especially true in the forming of the case itself. Here, tolerances are critical—with an exact fit of the crystal inside the watch case essential to keep it from falling out. Gruen prefers the Bliss Hydro-Dynamic presses for this job—holding tolerances to several ten-thousandths of an inch.

Equipped with high- and low-pressure pumps, these Bliss Hydro-Dynamic presses are the moving-up type . . . especially suited to industries employing sub-die processes. Their efficient, accurate operation is typical of results obtained with Bliss Hydro-Dynamic presses in all types of plants. At Gruen, *72% of the presses are Bliss-built.*

Let Bliss, the world's largest press builder, apply its long experience to *your* next press problem. Talk it over with a Bliss sales engineer. He can help you select the right press for your special requirements. Meanwhile, for more detailed information about Bliss Hydro-Dynamic presses, write for Catalog 30-A.

BLISS **on your press is more than a name . . . it's a *guarantee***

E. W. BLISS COMPANY, Canton, Ohio

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Subsidiary: The Die Supply Company, Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Company (Peris) France

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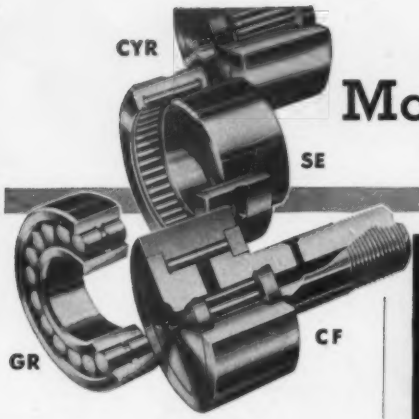
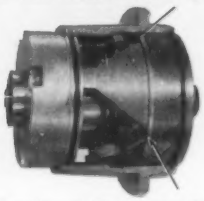
McGILL BEARING BRIEFS

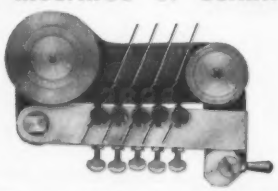


MULTIROL CF BEARINGS PROVIDE POSITIVE CAM ACTION IN ANCHOR CUT-OUT



Anchor Steel and Conveyor Company relies on Multirol Cam Follower Bearings for positive and instant operation of Anchor cut-out couplings. When dangerous overload occurs this torque sensitive coupling cuts power when a spring loaded sliding sleeve is actuated by forcing CF series bearings up the inclined faces of a circular cam. Shock load capacity and dependability of CF series bearings combine to help the Anchor Company protect motors and machinery from damage due to overload.

SJOGREN KILLERS CAST WIRE ON MULTIROL CF BEARINGS



On Sjogren Killers for casting wire, Multirol CF bearings with outer races grooved to required wire size have replaced hardened steel rollers. Sjogren maintained required accuracy at much higher casting speeds with minimum of grease instead of objectionable oil lubrication.

Warner & Swasey Uses MULTIROL® CF Bearings as

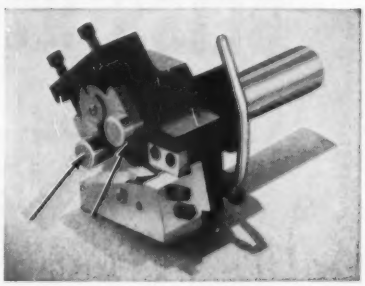
STEADY REST ROLLERS ON TURRET LATHES

The precision turning done on Warner & Swasey Turret Lathes depends to a great extent on providing adequate, accurate and free turning support for the work in process. The pressure of the cutting tool must be backed up on the end opposite the chuck so that depth of cut and concentricity remains constant.

This support is provided with tool holders using two Multirol Cam Follower bearings as steady rest or bar turning rollers. The precision quality of these rolls is very important to efficient operation. Free turning rolls of adequate capacity will assure work with a smooth finish and a high degree of accuracy.

Warner & Swasey have been using Multirol CF Series bearings in this application for over 15 years. They adopted the McGill bearing after finding its precision quality, resulting from close radial tolerances, ideal to help insure superior lathe performance.

The outer ring of Multirol CF Bearings operates on a full complement of small diameter rollers so the load is



evenly distributed over a greater bearing surface. The inner race and flange are made in a single piece with the stud, preventing any possibility of disassembly. Close tolerance grinding of all bearing surfaces insures greater accuracy throughout longer bearing life and, compared with plain bearings, lubrication is simplified and less critical. Both starting and rolling friction are reduced to a minimum. As a result, internal wear is diminished and power requirements of Multirol bearing equipped machines are cut appreciably.

BEARING SELECTION GUIDE
A new 140-page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Co. Ask for Catalog No. 52.

McGILL® — Precision Bearings
McGILL MANUFACTURING COMPANY, INC.
300 N. Lafayette Street, Valparaiso, Indiana

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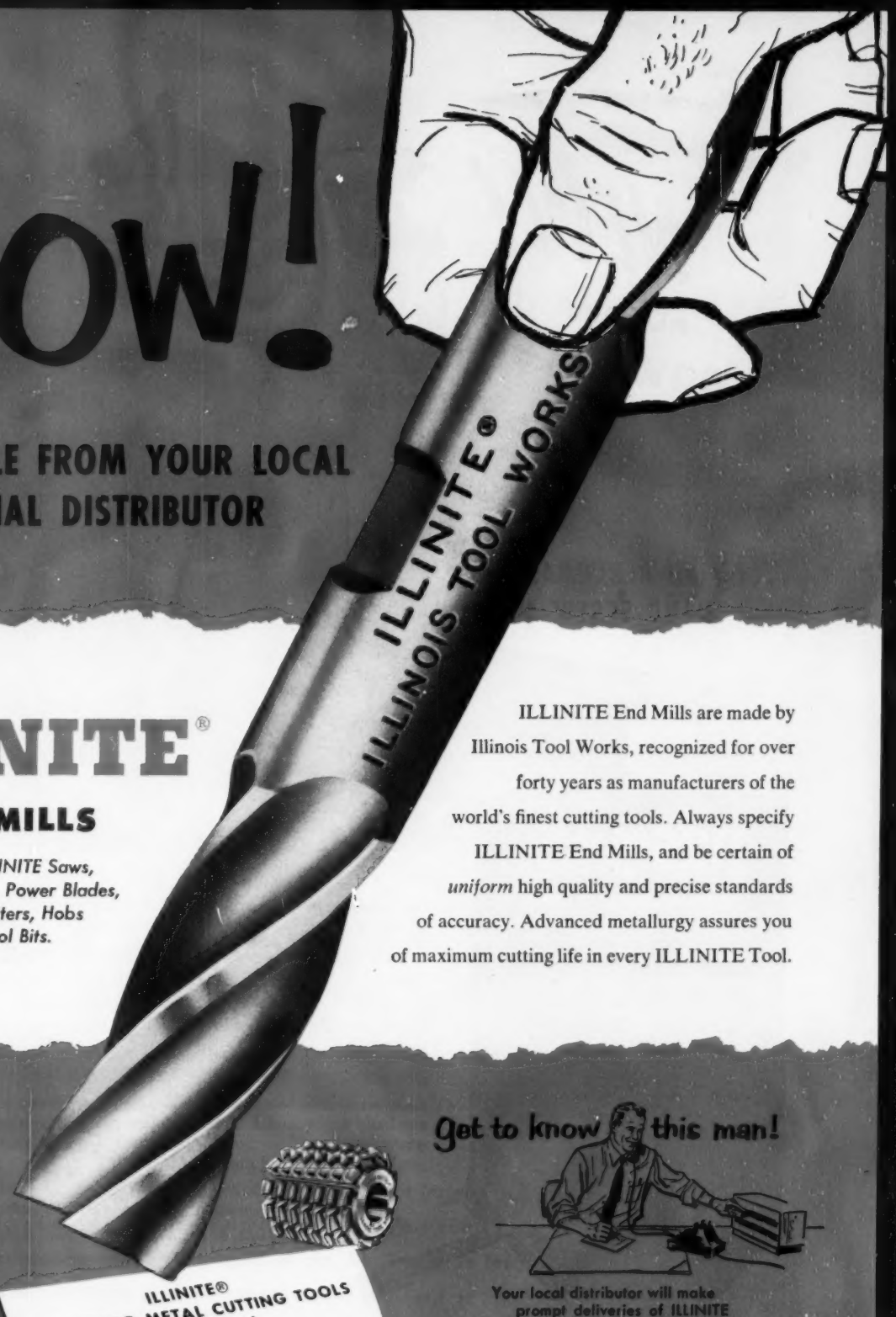

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ILLINITE End Mills are made by Illinois Tool Works, recognized for over forty years as manufacturers of the world's finest cutting tools. Always specify ILLINITE End Mills, and be certain of *uniform* high quality and precise standards of accuracy. Advanced metallurgy assures you of maximum cutting life in every ILLINITE Tool.

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Your local distributor will make prompt deliveries of ILLINITE Standard Cutting Tools, from stock. Depend on him—and on ILLINITE Tools—to meet your cutting tool requirements.

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AUTOMATIC power feed

...for all BENCHMASTER HAND-SCREW MILLS!

$125.00 F.O.B. FACTORY

Complete, Ready to Install and Plug In

MOTOR: 1/15 hp, 110 V. AC 60 Cycle

MECHANISM: Bronze Gear, Steel Worm

WEIGHT: Approximately 10 lbs., Net

DIMENSIONS: 4½" x 5½" x 8", less connecting shaft.

Four speeds in either direction! 1.2, 2.1, 3.2, and 4.5 inches of table travel per minute...all independent of spindle speed and direction of rotation.

Powerful! Table drive equals or exceeds milling capacity of the spindle.

Table travel instantly reversible! Reversible motor and simple two-way switch instantly reverses direction of table feed. Adjustable stops limit table travel in either direction.

Doesn't interfere with manual operation! Lever quickly disengages worm gear drive, permitting use of ordinary hand feeds when desired!

Easily installed in 10-15 minutes! Two bolts secure unit to end of table on any hand-screw model. Slots in adapter permit easy alignment with lead screw, eliminate fussy hole location. (Note—not adaptable to production models with rack and pinion table feed.)

Available factory-installed on all new Benchmaster Mills, or as an accessory for all Benchmasters now in use! See your Benchmaster dealer today!

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1835 W. Rosecrans Avenue
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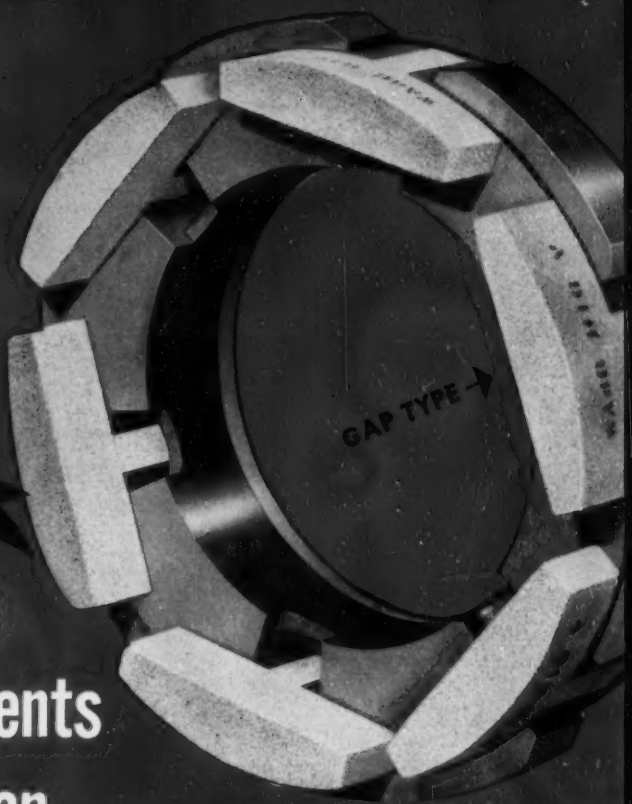
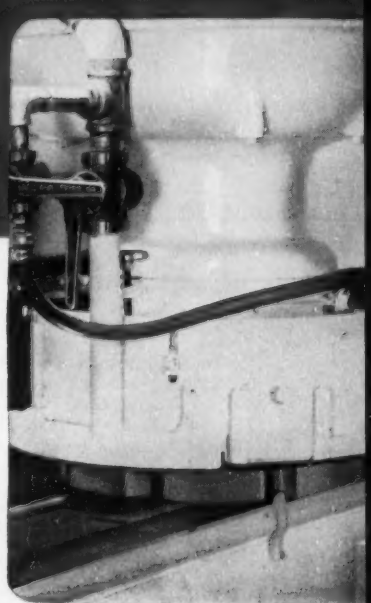
World's largest manufacturer of small punch presses and mills.

any way you look at it...

SIMONDS ABRASIVE CO.



Abrasive Segments mean surface grinding with savings



Less expensive than cylinder wheels. More uniform in grinding characteristics. Easily handled. Quickly mounted. Fast cutting. Compact for less storage. Fit all types of chucks. Gap type for large flat surfaces—solid type for small pieces grouped or chucked together. Write for bulletin ESA-188.

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Typical Fillet Speeds

Electrode Size	Amps., AC	Fillet Size	Speed, in./min.
3/16"	290	1/4"	15
7/32"	325	5/16"	15
1/4"	395	3/8"	15

Deposition Rates

DH-5 Electrode Size	DH-5 Amps.	DH-5 Deposit #/hr.	E-6012 Deposit #/hr.
3/16"	250	6.8	4.5
3/16"	280	7.9	
3/16"	320	9.6	
7/32"	300	9.0	5.8
7/32"	340	10.1	
7/32"	380	12.0	
1/4"	350	11.2	7.0
1/4"	400	12.8	
1/4"	450	14.7	

Try to match this for

You can't — unless you use the . . .

Deposits up to twice as many pounds per hour as an E-6012

That's right, the DH-5 is in a class by itself, when it comes to high welding speed and sound deposits in horizontal and flat positions. It's Harnischfeger's answer to the demand for lower welding costs. It's your answer to the need for faster, better work.

Powdered metal in the coating becomes part of the deposit — increases thermal energy and efficiency. By simply dragging the DH-5, the operator gets the speed and bead appearance ordinarily associated with submerged arc welds.

Wherever they've tried it, weldors like the DH-5. It's fast, it's easy to use. There's no splatter. Slag removal is easy and quick. The bead shape is flat and smooth.

The DH-5 has good, as-welded, mechanical properties, too. See for yourself:

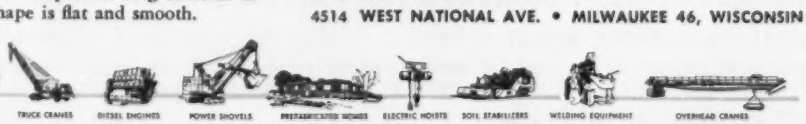
Tensile strength - - -	85,000-95,000
Yield strength - - - -	73,000-77,000
Elongation in 2" - - - -	15-25%

If you're interested in your cost picture — and who isn't, today?—you owe it to yourself to try the DH-5 without delay. See your P&H representative or distributor now.

For further facts, write for bulletin.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4514 WEST NATIONAL AVE. • MILWAUKEE 46, WISCONSIN

the P&H *Line*



2596

high-speed welding!

. . New P & H DH-5 Electrode

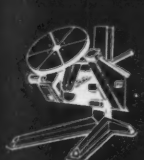
America's most complete line of arc-welding equipment and electrodes

P&H DC RECTIFIER WELDER

Four sizes — 200, 300, 400 and 500 amps (NEMA-rated). No moving coils to break down — no bearings, brushes, commutator, brush riggings, etc., to replace. Dial-lectric Control gives you fingertip heat-control at the work.

P&H AC WELDER

A full range of sizes up to 625 amps (NEMA-rated). All are connectable to 220 or 440 volts. Dial-lectric Instantaneous Remote Control is fingertip control — gives you any heat you want, right at the work.



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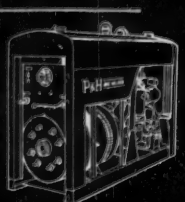
One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

P&H WN-250 ENGINE-DRIVEN ARC WELDER

NEMA-rated at 200 amps, but pulls 300 amps. Has full 20-gallon gas tank — runs all day on one tankful. Powered by four-cylinder, 180 GLU, Waukesha, water-cooled gasoline engine.



P&H Welding equipment is manufactured and sold in Canada by

REGENT EQUIPMENT MANUFACTURING COMPANY LTD.

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Backed By Years of Experience in the MANUFACTURE of CUTTING TOOLS...

THE CLARKSON CUTTER GRINDER

Simplicity . . . Speed . . . Economy are featured in the Clarkson Cutter Grinder . . . designed specifically for use in the manufacture of Clarkson Milling Cutters. All of the desirable features recognized as essential through years of experience, to the manufacture of cutting tools are incorporated into the Clarkson Cutter Grinder, yet it is low in cost, *right* for use in *your plant* for resharpening

- ★ END MILLS
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Write today for FULL INFORMATION on the Clarkson Cutter Grinder . . .

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Gentlemen:

Please send full information and prices on the Clarkson Cutter Grinder.

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The LINLEY JIG BORER

Put your small jig boring jobs on this precision machine

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.

Table movement: 6" x 10"; table size, 7" x 17½".

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664 STATE ST. EXT., BRIDGEPORT 1, CONN.

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gages ASSURE ACCURATE gaging

K7-R Bench Comparator with a fine setting adjustment will inspect either inside or outside diameters, on short or production runs, accurately and quickly. Available with several types of jaw arrangements, such as "T" plate (as illustrated), "V" plate, and "Y" plate.

TD-5 Comparator is a general purpose gage adaptable to a great many uses in the machine shop, tool room, and inspection department. Column may be mounted in either the up or down position.

STD-5 Comparator is equipped with a long range fine setting adjustment built integral with the indicator arm, giving all the advantages of the TD-5, plus.

For complete information on the Acra-Ment line of dial gages, write to

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GAGE DIVISION OF
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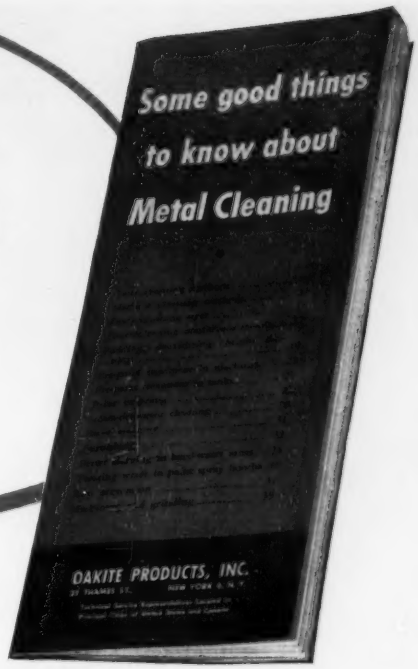
633 Park Avenue, Cranston, R. I.

WHICH OF YOUR METAL-CLEANING JOBS WOULD YOU LIKE TO IMPROVE?



¶ Are you cleaning metal in the most economical way? *See page 9 of Oakite's* FREE *booklet on Metal Cleaning.*

¶ Are you cleaning metal the fastest way? *See page 11.*

¶ Can you clean brass anodically with no tarnish? *See page 18.*

¶ Can you clean steel and prepare it for painting for less than 20 cents per 1,000 square feet? *See page 24.*

¶ Do you need a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? *See page 28.*

¶ How do you clean parts that are too large to be soaked in tanks or sprayed in machines? *See page 30.*

¶ Does your burnishing barrel produce high luster? *See page 32.*

¶ What do you do when oversprayed paint neither floats nor sinks in your paint spray booth wash water? *See page 35.*

¶ Would you like to eliminate expensive drying from your anti-rust procedure? *See page 37.*

LISTED BELOW are some of the operations discussed in this 44-page illustrated booklet. Please check the jobs in which you are interested. Then let us show you how Oakite methods can give you better production with greater economy.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE

OAKITE PRODUCTS, INC., 24 Rector Street, New York 6, N. Y.

Tell me about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning steel
- ☐ Electrocleaning non-ferrous metals
- ☐ Pickling, deoxidizing, bright dipping
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ Treating water in paint spray booths
- ☐ Machining and grinding
- ☐ ALSO send me a FREE copy of your booklet "*Some good things to know about Metal Cleaning*"

*Name*_____

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Technical Service Representatives in Principal Cities of U. S. and Canada

10 TIMES THE PRODUCTION LIFE

FROM THESE "CAST-TO-SHAPE" SWAGING DIES

SEND FOR THIS NEW CATALOG
"FORGING AND CASTING PRODUCTS"

It's hot off the press with full details on FCC Air Hardening, Oil Hardening and other Cast-to-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections, and Smooth-Hammered Forgings in a wide range of tool and stainless steels. *Don't wait—get your copy NOW.*

Write Today

ADDRESS DEPT. AM-50

The John Deere Plow Works of Deere & Company formerly used cast grey-iron dies to swage AISI 1070 F steel plow beams. Die life was, at best, a mere six weeks or about 8,000 parts.

They switched to A-L CAST-TO-SHAPE swaging dies of FCC No. 66 tool steel, hardened and drawn to 57-58 Rockwell "C". The new dies ran *fourteen months*—eight hours a day, five days a week—before redressing was necessary. Approximately *83,875 Parts* (over ten times the production) were swaged in that period! Production has been maintained at that level since.

You, too, can save time and money with the modern FCC CAST-TO-SHAPE method of tool and die making. Don't forget, you also buy *less* steel and reduce machining costs. It's a matter worth investigating. ● Check with your A-L representative TODAY . . . or write *Allegheny Ludlum Steel Corporation, Oliver Building Pittsburgh 22, Pennsylvania.*

For complete MODERN Tooling, call

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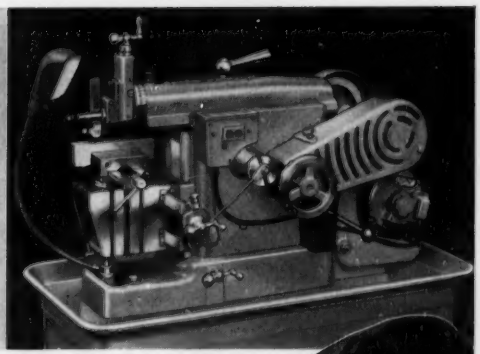
FINE TOOL STEELS
SINCE 1854

W&D 4687

South Bend 7" Shaper

FAST · EFFICIENT · ECONOMICAL!



Watch your machining costs on small work go down when a South Bend 7" Shaper takes over.

FIRST, its speed — 42 to 195 strokes per minute reduces machining time.

SECOND, its 7" stroke will handle a good share of your small toolroom, maintenance and production jobs thus releasing your heavy shapers for larger work. This stops the waste of using excess machine capacity on small jobs.

THIRD, with its small initial cost, less power consumption and low upkeep expense, your equipment budget won't take a beating when you specify South Bend 7" Shapers. Find out how these fast, versatile shapers can save you money. Call your local South Bend distributor today or send the coupon for complete information.

SPECIFICATIONS

RAM

Stroke length . . . . . 0 to 7"
Strokes per min. (4) . . . 42 to 195
Cutting speeds . . . 3 to 114 feet per minute

TOOL HEAD

Vertical travel . . . . . 3"
Tool post slot . . . . . 3/8" x 7/8"
Head swivels . . . . . 360°
Clapper swivels . . . . . 35°

TABLE

Vertical travel . . . . . 5"
Horizontal travel . . . . . 9½"
Power cross feeds (6) . . . . . .002" to .012" (reversible)
Size . . . . . 6 5/16" x 5" x 5 3/8"
Distance from ram . . . ½" to 5½"

VISE

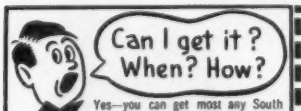
Maximum opening . . . . . 4"
Jaw width . . . . . 4"
Jaw depth . . . . . 1"
Height over table . . . . . 2 11/16"

MOTOR

⅓ or ½ h.p.

$551.00

CS100, less motor, metal stand, tool holder. f.o.b. factory. Terms: 10% down, balance in 12 or 18 months.



Yes—you can get most any South Bend product immediately from our distributor's stocks in principal cities. Items not stocked, shipped promptly from factory.

Three ways to order:

1. See or telephone nearest distributor.
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South Bend machine tools with accessories may be purchased on convenient terms.

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A McKenzie separates a day's production of an automatic screw machine in minutes! No matter what screw machine product you produce . . . if you produce it in quantity you need a McKenzie Screw Machine Chip Separator. Models for any size of part. Just mail coupon below for complete information.

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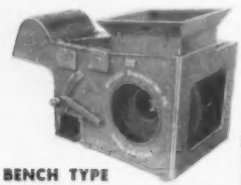
Processes larger parts from 3/16 in. to 2 in. diameters, 1/4 in. to 5 in. lengths.



BENCH TYPE
Processes small precision parts of watches, instruments, etc., up to 1/2 in. by 1 in.

SUCTION ATTACHMENT*
For use with Bench Type Separator when processing extremely small watch and instrument parts.
* Available as an accessory at extra cost.

THE McKENZIE ENGINEERING COMPANY
Box 39, Newtown, Connecticut
(Western Sales Office: 530 West Sixth Street, Los Angeles 14, California)
Please send data, including prices, on your Screw Machine Chip Separator.
☐ Floor Type ☐ Bench Type
Name..... Title.....
(Please attach to, or write on, your business letterhead)

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PREVENTS INJURY — SAVES GLOVE COSTS

Feeds ferrous, non-ferrous strip or sheet . . . faster, safer. Use for stamping, shearing. Right or left hand non-slip fitted grip, self-adjusting. Sturdy, hardened work surfaces. FULLY GUARANTEED.

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Patented Cutting Off Blades

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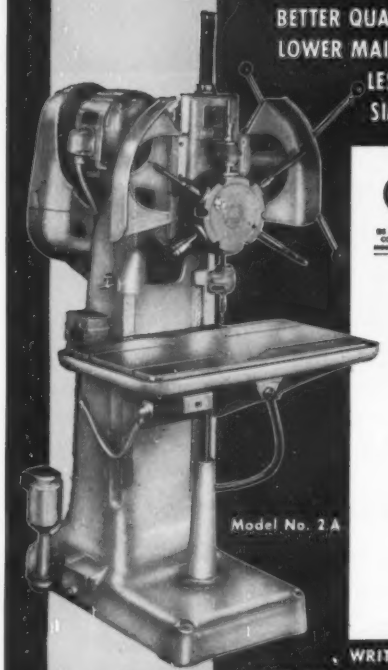

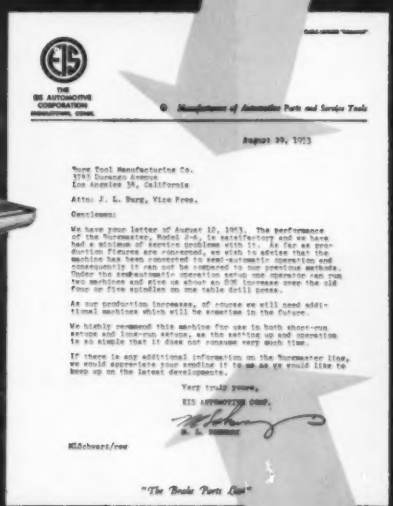

THE BS AUTOMOTIVE CORPORATION
Manufacturers of Automotive Parts and Service Tools

August 10, 1953

Burg Tool Manufacturing Co.
3743 Durango Avenue
Los Angeles 34, California

Attn: J. L. Burg, Vice Pres.

Gentlemen:

We have your letter of August 10, 1953. The performance of the Burgmaster, Model 2-A, is satisfactory and we have had a minimum of service problems with it. As far as production figures are concerned, we wish to advise that the machine has been converted to semi-automatic operation and consequently it can not be compared to our previous methods. Under the semi-automatic operation setup one operator can run two machines and give us about an 80% increase over the old four on five spindles on one table drill press.

As our production increases, of course we will need additional machines which will be sometime in the future.

We highly recommend this machine for use in both short-run setups and long-run setups, as the setting up and operation is so simple that it does not consume very much time.

If there is any additional information on the Burgmaster line, we would appreciate your sending it to us as we would like to keep up on the latest developments.

Very truly yours,
BS AUTOMOTIVE CORP.
R. L. Burgess

RLSchwartz/rew

"The Brake Parts Line"

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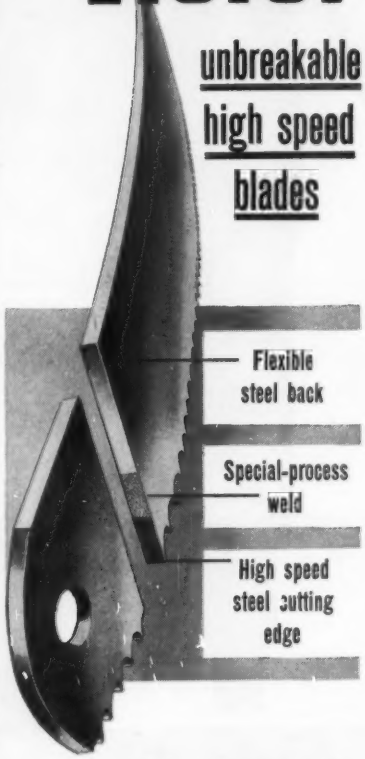
unbreakable high speed blades



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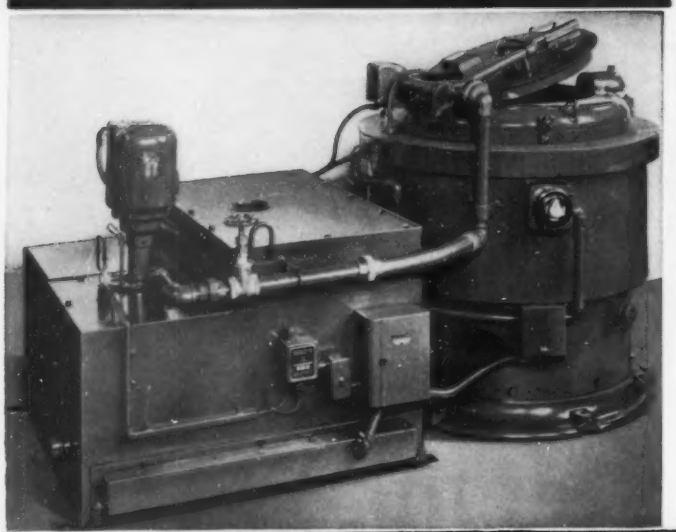

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This new Shop Manual, issued by The Staples Tool Co., provides valuable information on carbide-tipped reamer conditioning. Manual includes data on chamfer size . . . recommended clearance angles . . . method of O.D. and face of flute repair . . . special sharpening techniques for specific applications . . . diamond wheel requirements . . . other tips to improve your tool servicing technique.

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For maximum tool economy, specify Staples Carbide-Tipped Circular Tools for reaming, core drilling, spotfacing, counterboring and end milling jobs. Standard tools from stock—special tools designed to your requirements.

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Acromarker Model No. 7 Name Plate & Parts Stamping Machine.

ACROMARK Company

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"Don't have FITS over FASTENERS, have fasteners that fit."

For the finest in milled-from-the-bar cap screws — set screws coupling bolts and milled studs

don't get stuck—stick to the ones made by

*Wm. H. Ottemiller Co. YORK, PENNA.

What makes a "Red End" Blade cut better, last longer on the average than other blades? The answer's in the picture. Every "Red End" tooth takes exactly the same bite, curls the chip like a cutting tool on a lathe.

Because every tooth in every "Red End" Blade *is* exactly the same. It's all in the way we pour and roll our own steel . . . the way we mill the teeth to exact size and shape . . . set them evenly and accurately . . . and the special way we heat-treat them to a *uniform* hardness never believed possible before.

The result is *faster, straighter* cutting, and *many more* cuts per blade. If you haven't tried them yet—your local Industrial supply Distributor stocks 'em. Get some today and see.

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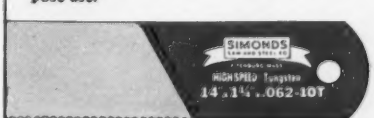
There's a RED END Blade For Every Job

HIGH SPEED MOLYBDENUM — the RED Blade for cutting mild alloy steels and general purpose use.



HIGH SPEED TUNGSTEN — the GREY Blade for cutting hard alloys and stainless steels.

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What are the facts about cancer of the lung—?

JUST 20 YEARS AGO, in 1933, cancer of the lung killed 2,252 American men. Last year, it killed some 18,500.

WHY THIS STARTLING INCREASE? Our researchers are finding the answers as rapidly as funds and facilities permit—but there isn't enough money.

DOCTORS ESTIMATE that 50% of all men who develop lung cancer could be cured if treated in time. But we are actually saving only 5% . . . just one-tenth as many as we should.

WHY—? Many reasons. But one of the most important is not enough money . . . for mobile X-ray units, for diagnosis and treatment facilities, for training technicians and physicians.

THESE ARE JUST A FEW of the reasons why *you* should contribute generously to the American Cancer Society. Won't you please do it now? *Your* donation is needed—and urgently needed—for the fight against cancer is *everybody's* fight.

Cancer
MAN'S CRUELEST ENEMY
Strike back—Give

AMERICAN CANCER SOCIETY
GENTLEMEN:
☐ Please send me free information on cancer.
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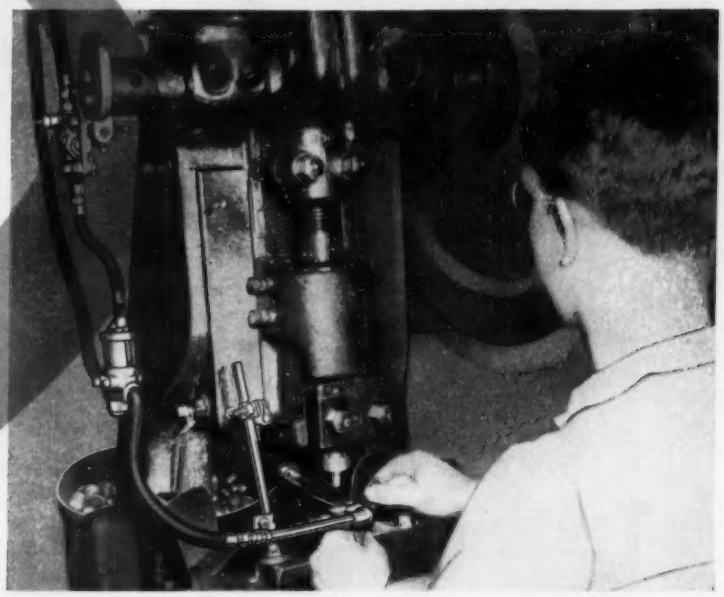
how much can air ejection boost your production

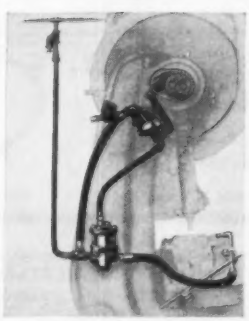


Actually, it can *double production.* With Schrader Air Ejection Sets on your presses, after each press cycle, there's a quick puff of air—automatically timed to do the job just right—and you're set for the next blank to be inserted.

No more tedious, dangerous hand removal!
No more wasteful steady air blasts!

Schrader Air Ejection Sets come in many types to suit any need. You can buy them for cam operation off the crankshaft, or for roller tripper actuation from the ram. If the parts you are fabricating are too heavy to be blown from the dies by an air blast, the Schrader Cylinder Knockout Set is available, which utilizes the knockout force available from a push-type Schrader Cylinder.

But regardless of the type of ejection set you need, you'll find one exactly suited to your requirements at Schrader. Schrader Air Ejection Sets come complete with all necessary fittings, valves, hose and air line accessories—all ready to be bolted to your press. Write today for full details.



This is the Schrader No. 3208W Air Ejection Set. Similar sets are available for cam or tripper operation, with or without pilot valve timing.

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since 1844

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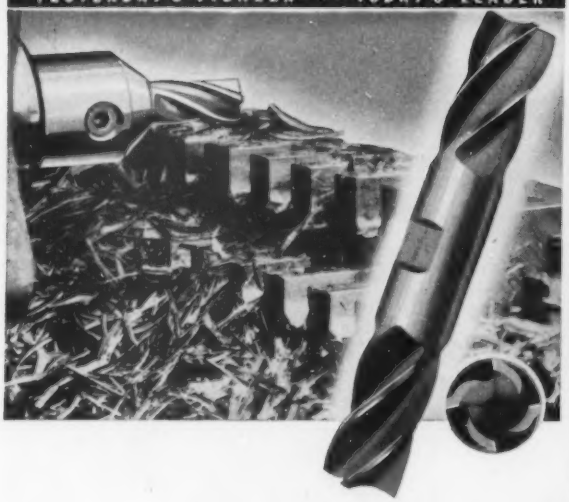

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It's the "teeth" in Weldon End Mills that tell the story of more production and bigger profits on your jobs.

Weldon pioneered in producing *scientifically designed* teeth for end mills, a step over 25 years ago that opened the door to higher speeds, and faster feeds.

Call the Weldon representative.

After lengthy experiment and study, the *tooth shape* and *spiral angle* on Weldon End Mills were radically altered from conventional styles. The result was a tooth that *allows chips to curl out without clogging* and *insures better performance* and *longer life for the tool.*

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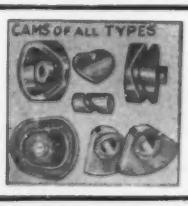

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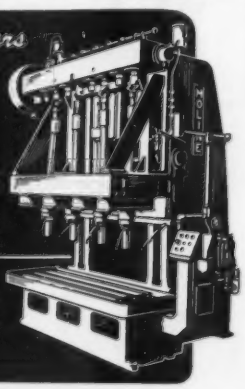

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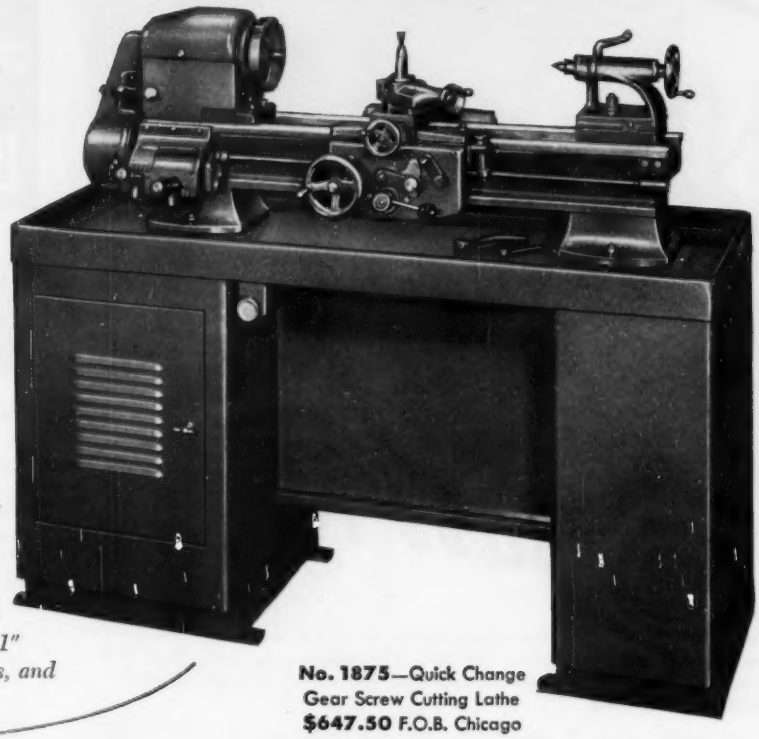
THIS Logan 10" SWING* LATHE

WILL DO THE JOB AND CUT THE COSTS...WHEREVER YOU USE IT



** One of the many in the complete Logan line of 9", 10", 11" and 12" swing Lathes, and 8" Shapers.*

No. 1875—Quick Change Gear Screw Cutting Lathe **$647.50** F.O.B. Chicago

Brief Facts

Swing over bed, 10½"

Center Distance, 24"

Bed Width, 6 15/16"

Ball Bearing Spindle

Spindle Hole, 25/32"

16 Spindle Speeds, 38 to 1230 rpm

Double V-belt Drive for extra power to spindle is completely enclosed

Threads—46 selections, RH or LH—4 to 216 per inch

This trim, compact, 10" swing Logan Lathe is built with advanced design features and to precision standards outstanding in its field. Its spindle turns on pre-loaded *ball* bearings of extreme precision, so adaptable to all speeds they need no adjustment in the full range of 38 to 1230 rpm. The automatic apron, double-walled and friction-free, with spline driven power cross feed, has a convenient, lever-operated disc-type clutch. The two V-ways and two flat ways of the heavy-ribbed, special alloy bed are precision ground to within .0005" of perfect alignment. At vital wear points self-lubricating bronze bearings minimize friction and sustain accuracy.

Because that's the way it's built, this lathe holds exacting tolerances through extra years in production, tool room, or maintenance work. It saves space. It cuts power costs. Quick, easy set-ups minimize time loss. Apprentice operators find it easy to handle. Its price shares with you the major savings of finer tooling and efficient production in the modern Logan Plant. Ask your Logan Lathe dealer for full facts.

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Logan ENGINEERING CO.

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*Reg. Pat. Pending

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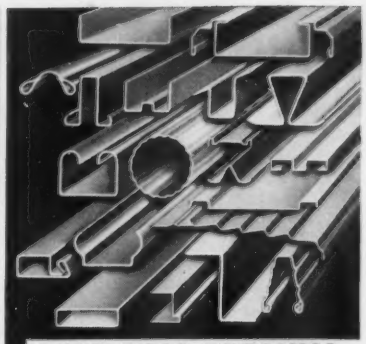

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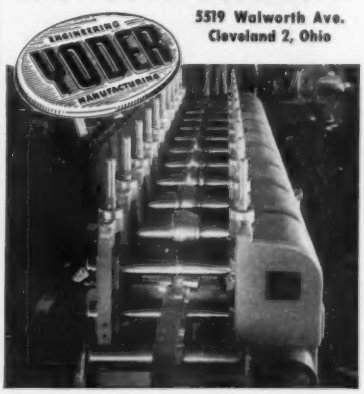

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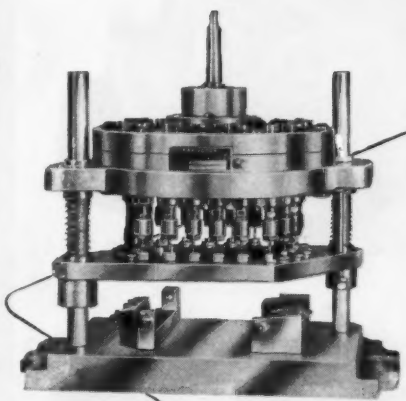

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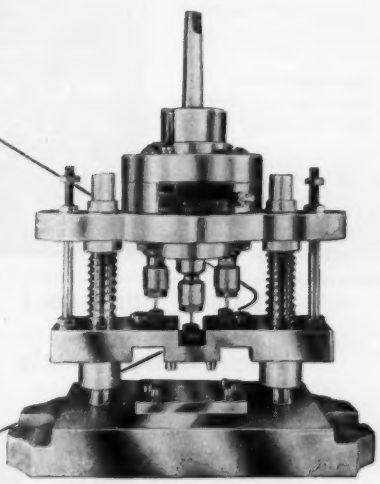

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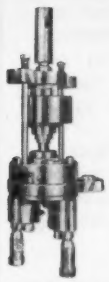

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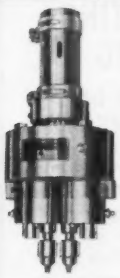
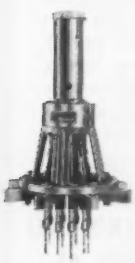


ADJUSTABLE DRILLING HEAD

This versatile tool permits you to take advantage of a wide range of adjustment without overhang.



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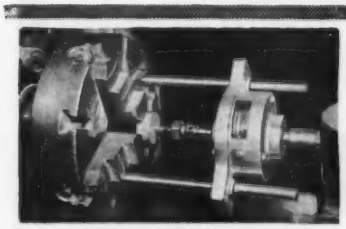

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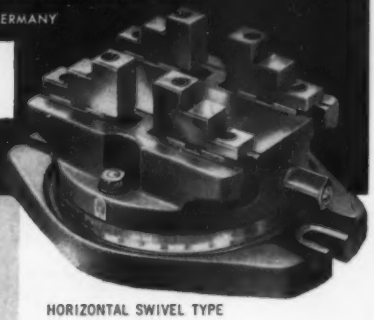

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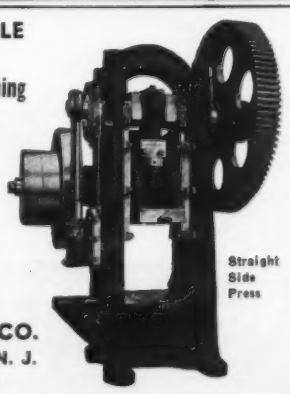

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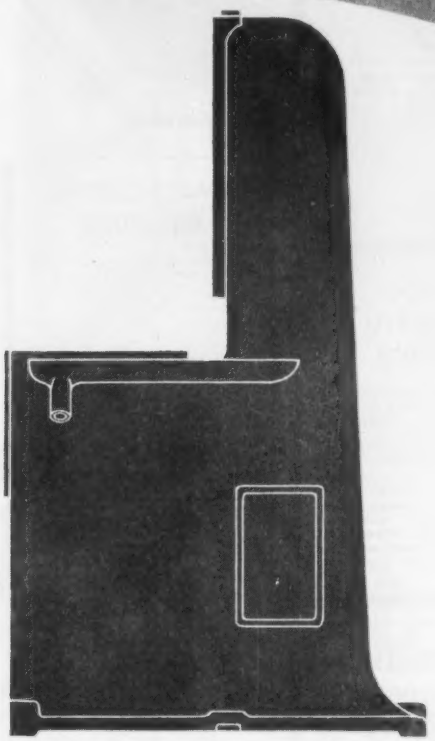

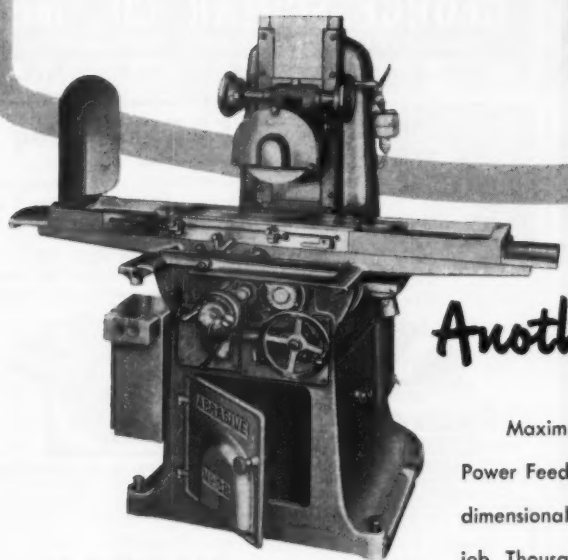

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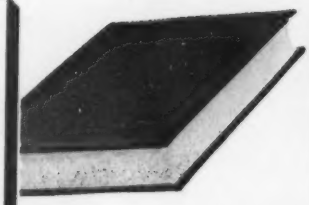

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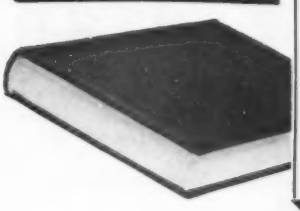

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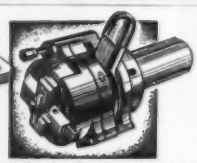

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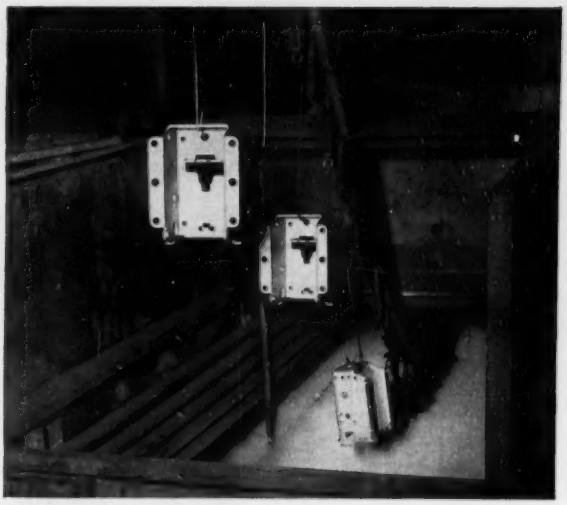

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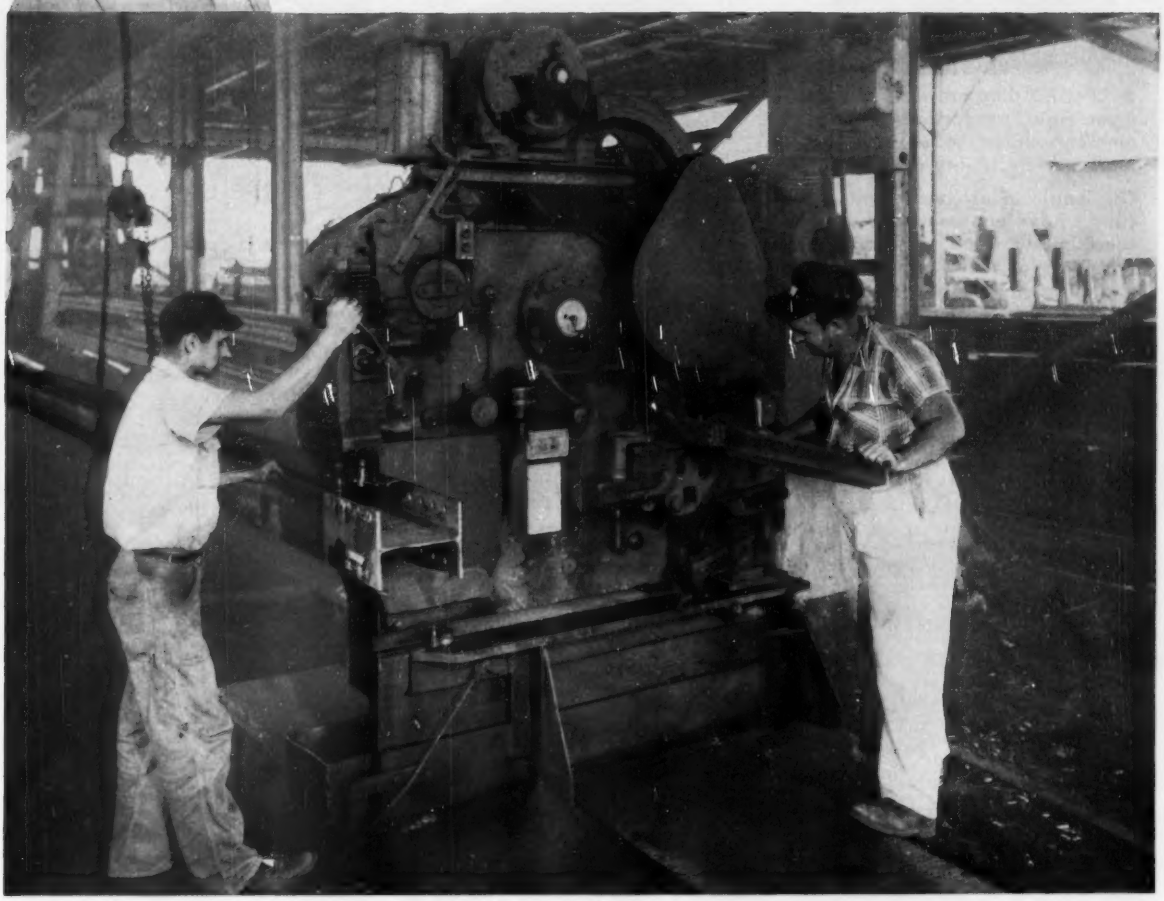

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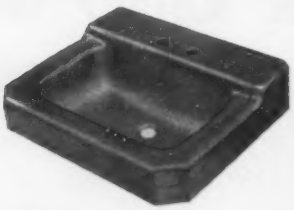

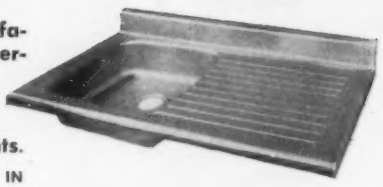

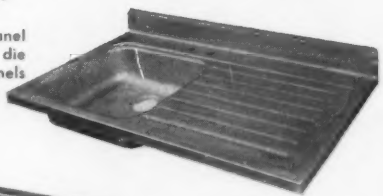

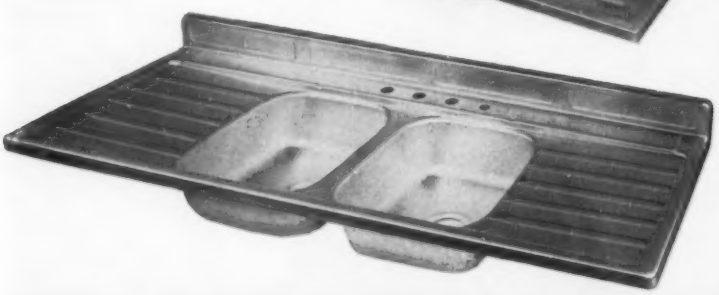

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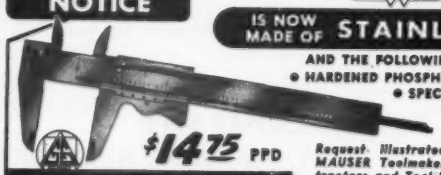

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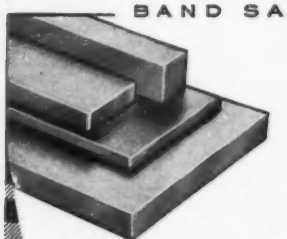

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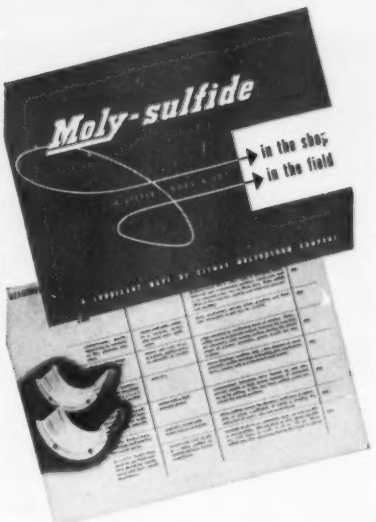

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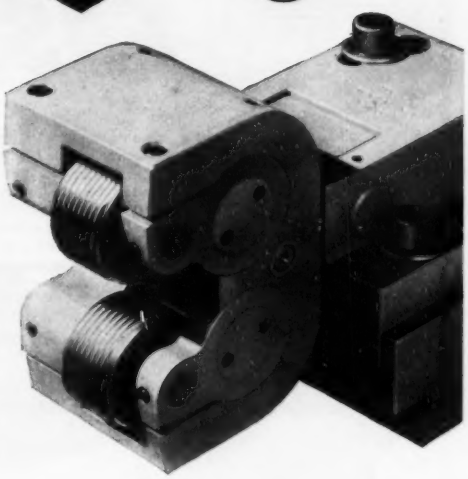
Thread Rolling . . . as a Primary Operation

with Reed Thread Rolling Attachments on Screw Machines and Lathes



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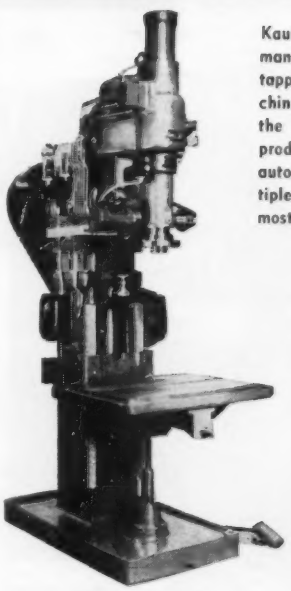

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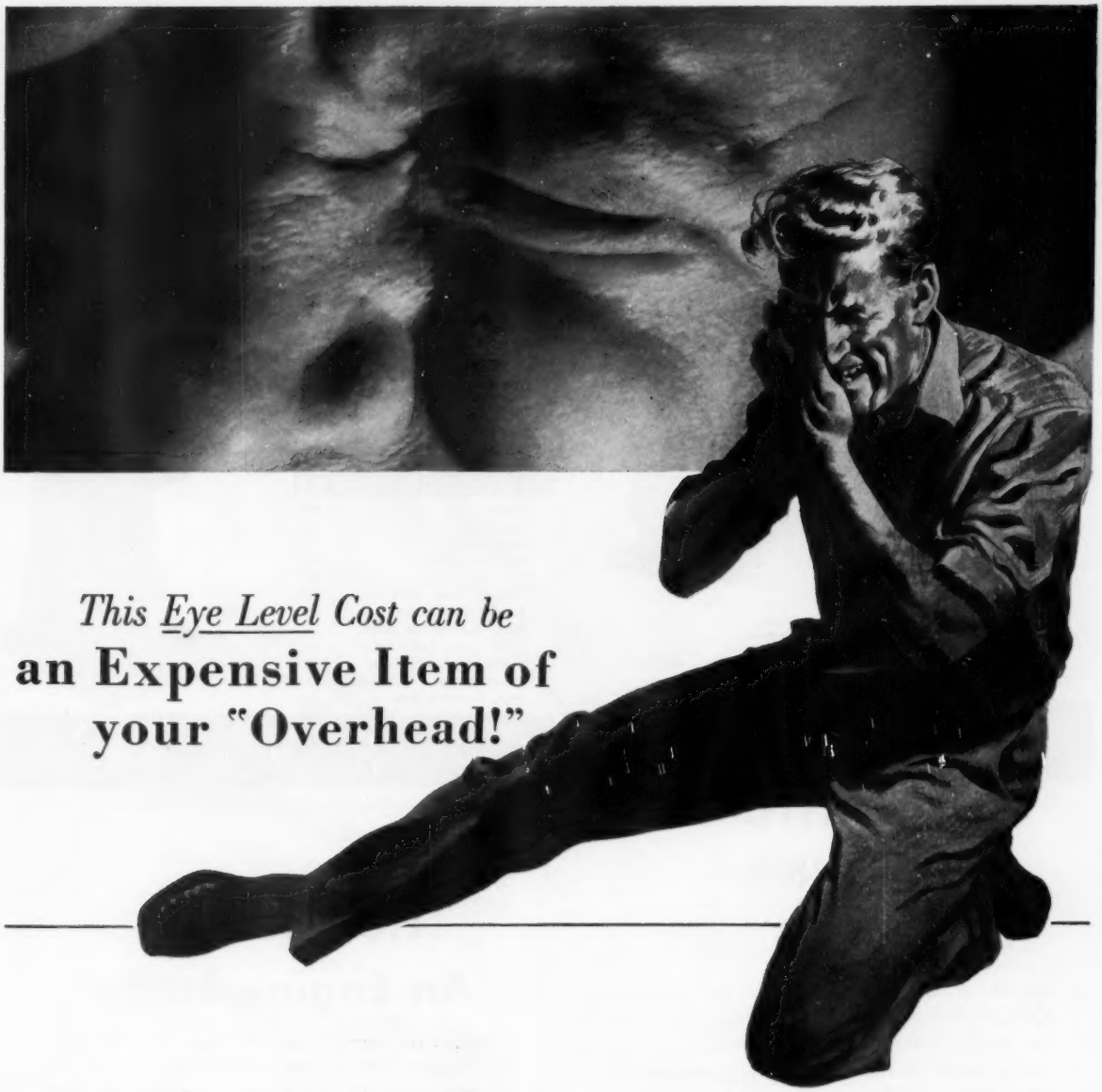

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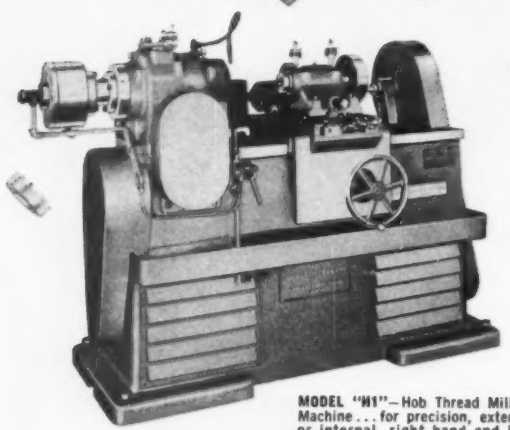

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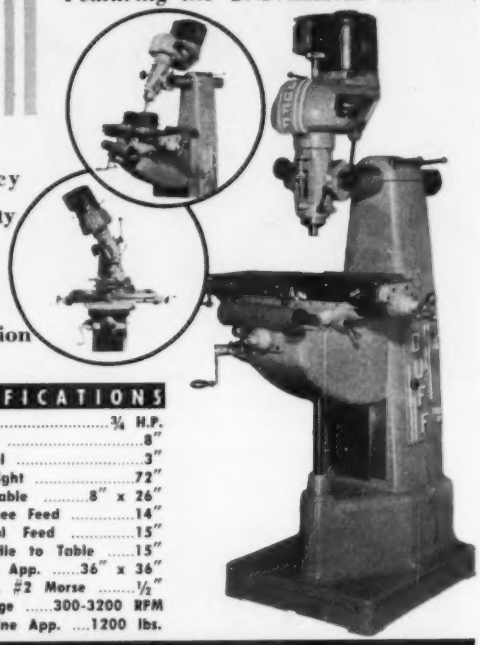
for accuracy and versatility in the tool room or in production



SPECIFICATIONS

Motor	¾ H.P.
Cross Feed	8"
Quill Travel	3"
Overall Height	72"
Size of Table	8" x 26"
Vertical Knee Feed	14"
Longitudinal Feed	15"
Max. Spindle to Table	15"
Floor Area App.	36" x 36"
Collet Cap. #2 Morse	½"
Speed Range	300-3200 RPM
Wgt. Machine App.	1200 lbs.

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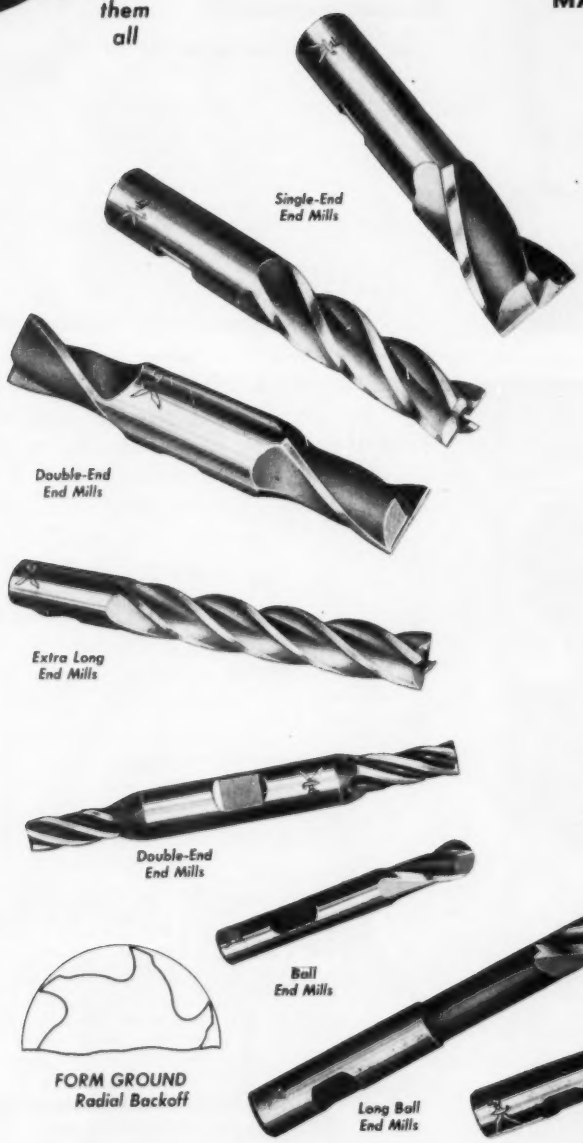

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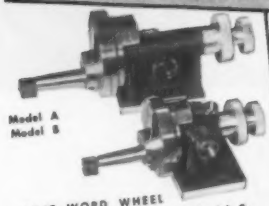

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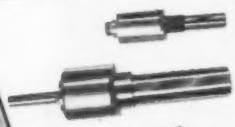

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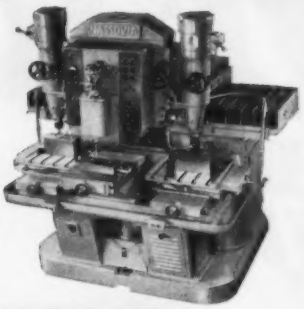

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Surface finish: 0,00004" – 0,0002"

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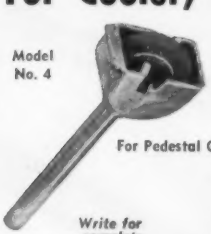

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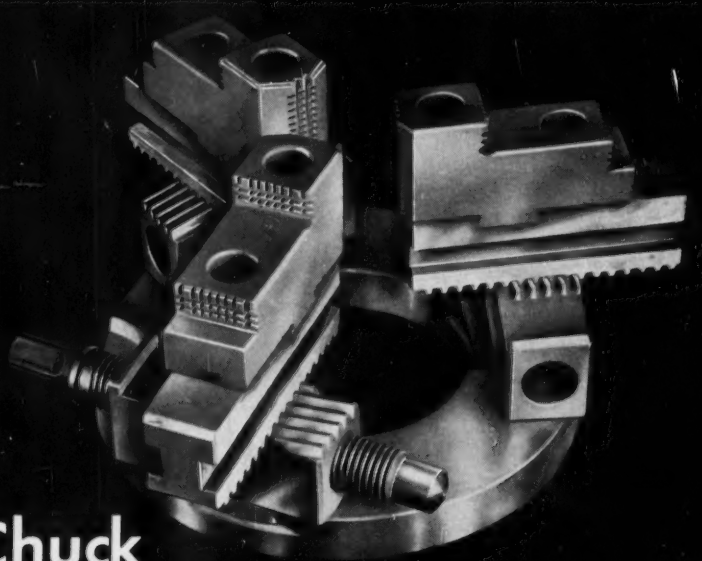

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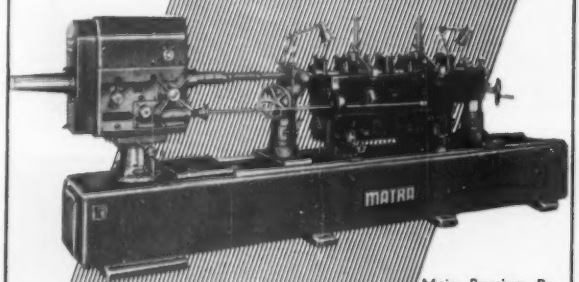

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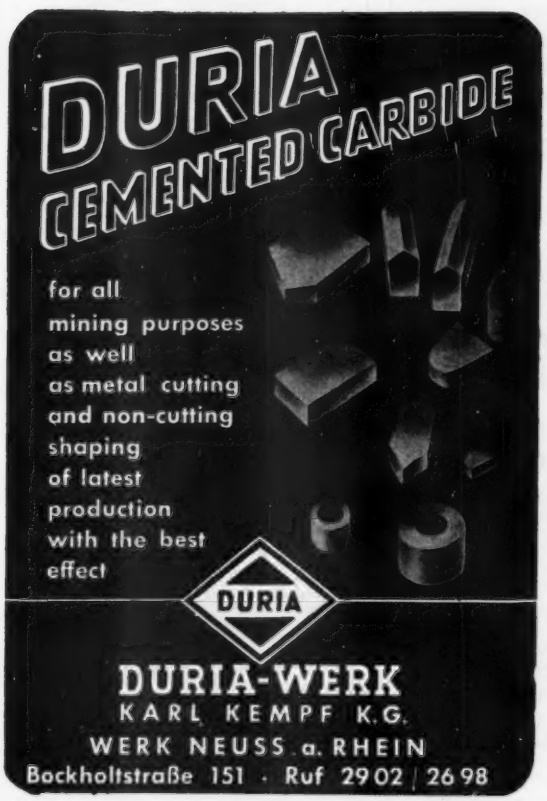

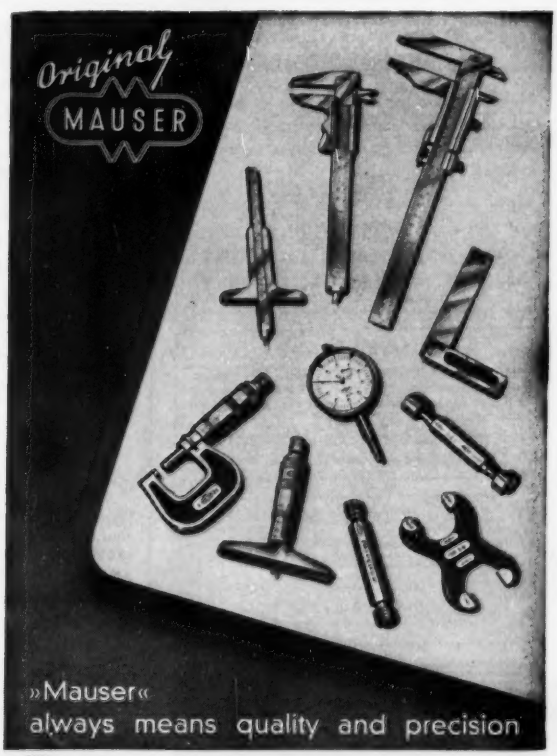

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BLIND VETERAN—trained in machine shop practice, can operate engine lathe, miller, shaper and surface grinder, as well as drill press using jigs and is good assembler. Seeks production job on engine lathe. New York City or vicinity preferred. PW-1513, American Machinist.

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New "SEARCHLIGHT" Advertisements

received by February 15th will appear in the March 1st issue, subject to space limitations.

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AUTOMATIC, Cleveland Model #B-1½" Sgl. Spdl.
AUTOMATIC, #2 B & S Wire Feed, 1" screw. Cap.
AUTOMATIC, #4 Brown & Sharpe, M.D. Tooling.

BALANCER, Anderson Bros. 14"x64". Pote-Checker
BORING MILL, 24" Bullard New Era M.D. Turret Head, Side Head.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 2¼" Lucas Horiz. M.D.
BORING MILL, Lucas Horiz., 3" Bar, M.D.
BORING MILL, Giddings & L. #0 Horiz. 3½" Bar.
BORING MILL, 100" Niles B-P M.D. 2 swivel hds.
BARRELS, Tumbling Lupomatic, Schutte & Koerting.
BRAKE, #335 Chicago, M.D., Press 6', #338.
BRAKE, #185 Chicago Power Apron, 8'3/10" cap.
BROACH, La Pointe 5 ton, 36" stroke, #1 Late.

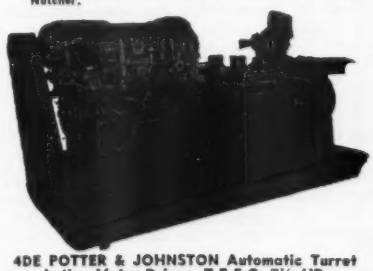
CHIP WRINGER, 23" Barrett, M.D. with Hoist.
COMPRESSOR, Ingersoll Rand ER-1, 10 HP, M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New.
COMPRESSOR, C-P 50 HP, M.D., 10x10, 278 CFM.
CRANE, OET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CRANE, 6000 lbs. Cullen-Friestadt, Portable Gantry.

RADIAL DRILL, 3'9" Mueller, M.D.
RADIAL DRILL, 3'11" Canedy-Otto, M.D., Late.
RADIAL DRILL, 4'11" Cincinnati Bickford, M.D.
RADIAL DRILL, 4'x15" Cinc. Bickford Super Service.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL 6'15" Cincinnati-Bickford, M.D.
RADIAL DRILL, 30" Walker Turner M.D., Late.
DRILL, Fosdick 16", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto. S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draulic #2 M.D.
DRILL, Edlund #2B. 3 spdle. #2 M.T., 16".
DRILL, 6 spindle Allen No. 2 M.T., Late Model.
DRILL, 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle CS. 10 Sp. M.D.
DRILL, Natco Multiple Spdle #12, #1 M.T., M.D.
DRILL, PRESSES, Leland Gifford #1MS, 1, 2, 3, 4
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S. #4 M.T., 1¾" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
DEEPFREEZE Motor Products 40 below zero.
DEMAGNITIZER, SB-911 Magnaflux, late type.

FACING HEADS, 20" & 24" Mummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, Type P4 Oliver Floor Type, M.D.
FURNACE, Westinghouse Elec. 18 KW. 2100°F cap.

GRINDER, Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Norman Hand Surf., 6"x12".
GRINDER, #2 Imperia Univ. Tool & Cutter, New.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Heald Rotary #25, M.D. 16" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Sur.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer #51.
GRINDER, Aliver Template Tool Bit M.D., Late Model.
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, 6"x18" Norton Hyd. Horiz. Surface, M.D.
GRINDER, Landis 6"x18" Cyl., M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterheim Disc. 24" cap.
GEAR LAPPER, #6LS, #13LS1 Follows, Outboard Supports, Detachable Laphead, Late.
GEAR SHAPER, Follows #6 High Speed, M.D.
GEAR SHAPER, Follows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 3/16".
INDUCTION HEATER, 16 KVA Ecco Hi Frequency.
INDUCTION HEATER, 30 KW Lepel, Late Type.
IRONWORKER, #½ Buffalo F. Univ. M.D., Coper, Notcher.

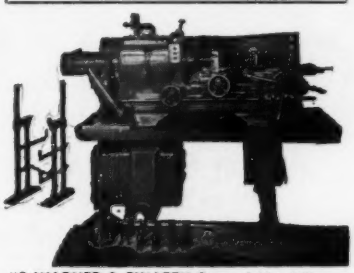


4DE POTTER & JOHNSTON Automatic Turret Lathe, Motor Driven, T.E.F.C. 7½ HP. 3/60.220/440.

AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #4, #5 Davis M.D., NEW.
KEYSEATER, #5 Mitts & Merrill, Grant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

2—No. 7 BARDONS & OLIVER Geared Head
Full Universal Turret Lathe, Presselector Head. Bar Feed 2½" cap capacity through spindle. Late Type, Motor Driven with tooling.

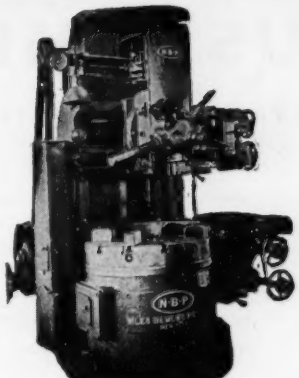


#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speed, Bar Feed.

LATHE, Le-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9"x15" Geared Head Prod.
LATHE, #6 WSL Reid Smallpiece Prod., Late Type.
LATHE, LeBlond 14"x6' Q.C.G. M.D.
LATHE, Hendey 14"x8' Q.C.G., Taper Attach. M.D.
LATHE, American 18"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 16"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-prentice 20"x10' Grd. Hd. M.D.
LATHE, 20"x16' Reed Prentice Grd. Hd., Late Type
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x10' Axelson Grd., Late, M.D.
LATHE, 24"x12' Boye & Emmes Grd. Hd., T.A., Late
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd Hd.
LATHE, Ledge & Shipley 26"x14' Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Bullfing Dble. End &VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #5 Warner & Swasey Univ. Late.
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #2 Cinci. Asme Univ. Geared Head.
LATHE, Turret #3A Warner & Swasey Univ. M.D.
LATHE, #801 Ostar Hand Turret, M.D., Late Type.
LIFT TRUCKS, 1 & 2 ton, Platform & Fork.

MILL, No. 1 U.S. Hand, Late Type, M.D.
MILL, #1-14 Kent-Owens Hyd. Late Type.
MILL, No. 1½ Milwaukee Plain Horiz.
MILL, #2 Kempsmith Maximiller Horiz., Vert. Hd.
MILL, #08 Cinc. Vert. Prod. Rotary Table.
MILL, 2M Cincinnati Univ. Horiz. M.D.
MILL, #3B Brown & Sharpe Vertical, M.D.
MILL, #3B K & T Horiz., M.I.B.
MILL, #3B K & T Vert. M.D.
MILL, #3VB Hardings Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #1 Garvin Plain Horiz., M.D.
MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U. S. Tool #MM-1-8 Auto. Prod.
MILL, No. 0 Brown & Sharpe Plain Horiz.
MILL, #0 Douglas Plain Horiz. M.D., Coolant.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, #0-8 Cinc., Horiz. Rise & Fall, Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cins. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cinci. Vertical Hi Power, M.D.
MILL, #5C Baker Vert. Die Sinker, M.D.
MILL, 42"x36"x12' Ingersoll Planer Type, 4 hds.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen Electric, 100 K.W.
NIBBLER, #136 Savage 36x3/16" Cap., M.D.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

42" Late Model KING Vertical Boring Mill. A.C. Motor Drive; 5 position turret head; Right Hand Side Head; 4 jaw Chuck table; Bijur System, Pendant control. New 1946. Excellent condition.

NAILING MACHINE, No. 16—48"-54" Morgan, Late.
PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, D72 & D673 Ferracute, Redraw, M.D.
PRESS, #2½ & #5 Toledo, OBI, Motor Driven.
PRESS, #5 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 70 & 90 tons, New.
PRESS, #39¼ Toledo Str. Side, M.D., 440 tons cap.
PRESS, 70H & 125PA Drake Hyd. Arber, New.
PRESS, #78½ Bliss tr. Side, 400 ton cap., M.D.
PRESS, Bliss #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 68 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #66 Whitney Doer Thr. 24" feet.
PRESS, P2, P3 Ferracute M.D. Reel feed.
WHEEL PRESS, 600 ton Niles-Bement-Pond, A.C.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #46 Buffalo Forge Vert. Cap. 1"x1½", M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hecker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End. 24" Thr. ⅛ thru 1".

ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, #1, #2 Buffalo Forge Vert. Angle Bending.
ROLLS, 72"x¼" Lewn Initial M.D., New.
ROLLS, 72"x12 ga. Wysong & Miles, Initial Type

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Radlas "J" DeSanno.
SAW, #8 Marvel Bandsaw, 18"x18" cap.
SAW, #4B Marvel Hack Saw 6"x8" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x8" cap., M.D.
SAW, 10"x10" Racine Hyd., Late Type, M.D., #30C.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SAW, V-26 DeALL Bandsaw, Late.
SHAPER, 16" Newark, Vise, M.D.
SHAPER, 20" Gould & Eberhardt V-ways, Vise, M.D.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, 24", 28" Gould & Eberhardt M.D.
SHAPER, 32" Cinci., G.G., Motor Driven, M.D.
SHAPER, Morton, 36" Draw-Cut, 4 speed M.D.
SHEAR, 10' x 10 ga. cap. Wysong & Miles, M.D.
SHEAR, 10' x ¼" cap. Wysong & Miles, M.D.
SHEAR, 6' x 14 ga. Parker M.D., Late Type.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60" Thrust, 10 ga.
SCREW SLOTTER, #2 Waterbury Farrel Auto.
SLOTTER, 12" New Haven Vertical M.D.
SPOTTER & SCROPER, Anderson Power Unit. Late.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 Cam Hanking, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
THREAD ROLLER, #20, #30 Waterbury Farrel.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER, Type 03DR, Steel City.
WELDER, 500 amp. Westinghouse Flexers A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WIRE STITCHER, Morrison & Acme, M.D

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TYPE D

12", 8 spindle, complete with motors, controls, 12" chucks and with double purpose and compound heads on each spindle. All machines are complete with the above.

10 complete machines—Excellent Condition

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2—Melling Crank Shaft Flange & Turning Lathes

2—Snyder Multi-Spindle Crank Shaft Second Operation Machines—All Late Equipment and in Excellent Condition

GEAR EQUIPMENT

7—Fellows Model #7 High-Speed Gear Shapers S/N FS168, FS186, FS234, FS249, FS262, FS263, 13237

1—Fellows Model 75 High-Speed Gear Shaper S/N 15418

2—Fellows Model 725A High-Speed Gear Shapers S/N 18714-19201

1—Cleveland Model #220—8 Spindle Hobber S/N 86-682

GRINDERS

1—Landis Pin Grinder

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MDNA MEMBER

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LATE MODEL

4¾" Model RA 4 spindle Acme Gridley
3½" Model RA 4 spindle Acme Gridley
2¼" Model 61 6 spindle New Britain Gridley
1⅝" Model 61 6 spindle New Britain-Gridley
1" Model RA 6 spindle Acme Gridley
1⅞" No. 4 Brown & Sharpe Single Spindle
#21 Reed Thread Roller
47A Heald Borematic, two heads, single end
993 & 995 Michigan Gear Lappers
48A Heald Borematic, single head, single end
¼" & ½" National Nut Tappers
2HL Kearney & Trecker Plain Miller
150 KVA Federal Seam Welder
6' 10 gage Parke All Steel Squaring Shear

JOHNSON MACHINERY CO.
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STEEL SHEAR

One ¼" x 10' Dries & Krump All Steel Shear complete with electrical equipment. First class condition. $5000.00.

BOWERS & WOOD MFG. COMPANY
WEST MEMPHIS, ARKANSAS

120 A-3 GARDNER GRINDER

23"x1" Wheels, Double Opposed, Wet, 30" Rotary Feed Wheel (1942), M.D.

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165 N. WATER ST. ROCHESTER, N. Y.

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ATTENTION EXPORTERS

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Rougher, #7 Fellows Gear Shaper, #16 D. E. Whiton Machine. Write for full information.

FS-1663, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

Eastern Rebuilt Machine Tools

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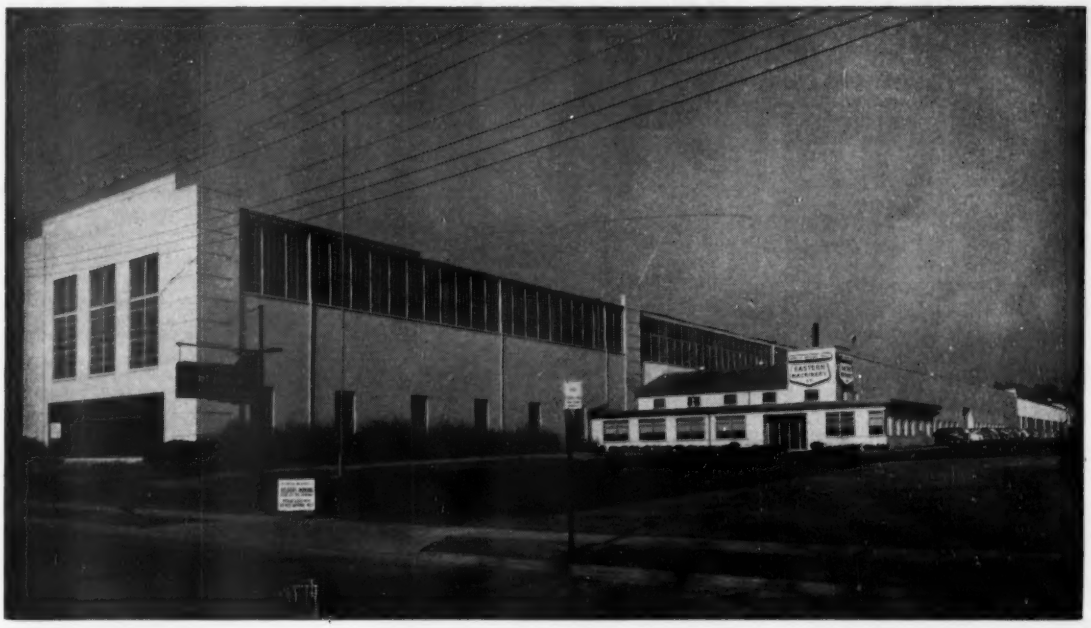

MULTIPLE SPINDLE DRILLS

#115U Moline Multiple Spindle Drill Press
No. 3 Baush, m.d., 16x30" head
No. 3 Baush, m.d., 20x40" head
No. 16 Foote-Burt Fixed Center, m.d.
3 spindle Rockford Gang Drill, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 28" Cincinnati Bickford Upright Drill, m.d., No. 4 Morse Taper
4 spindle Niles-Bement-Pond, m.d., 12' rail, No. 5 Taper
No. 924 W. F. & John Barnes Vertical Drilling, Boring, Facing & Reaming Machine

UPRIGHT DRILLS

D4 Colburn, m.d.
D6 Colburn Heavy Duty, m.d.
24" Aurora, belted m.d.
24" Cincinnati-Bickford, m.d.
24" extended to 36" Cincinnati-Bickford, m.d., upright sliding head
20" Aurora, m.d., taper
32" Aurora, belt drive
36" Cincinnati-Bickford, belt drive
No. 2 Colburn Mfg. Type, belted m.d.
No. 315 Baker Heavy Duty, s.p.d.
No. 417 Baker, m.d., later type
No. 513 Baker, m.d.
#4-48" Defiance Machine Co. Drill, m.d.
No. 242 Barnes All Geared Self-Oiling Drill Press

GEAR SHAPERS

No. 12 Fellows Gear Shaving Machine, m.d., late
No. 6 Fellows, belt drive
No. 7, 7A Fellows, belted m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 6I Fellows, belted m.d.
No. 6i Fellows, gear box, m.d.
No. 6IA Fellows, m.d., latest type
No. 643 Fellows, m.d.
No. 615 Fellows, m.d.
No. 645 Fellows, belt
No. 75 Fellows, m.d.
No. 712 Fellows, m.d.

GEAR CUTTERS

Gleason Spiral Bevel Gear Rougher, m.d.
3" Gleason Gear Generator, m.d.
8" Gleason Straight Bevel Gear Generator, m.d.
11" Gleason Straight Bevel Gear Generator, m.d.
Cincinnati Gear Burnisher, m.d.

GEAR GRINDING MACHINES

6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d.
9" Pratt & Whitney Hydraulic Spur, m.d.
10" Pratt & Whitney Hydraulic Spur & Helical
No. 13LS Fellows Gear Lapper, m.d.
SG11 Gear Grinding Machine, m.d., latest
GG19 Gear Grinding Machine, m.d., latest
GG31 Gear Grinding Machine, Internal Gear & Spline Grinder, m.d.

GEAR HOBBING MACHINES

No. 120H Gould & Eberhardt Double Head Universal, latest
Type A Barber-Colman, m.d.
No. 5AC Lees-Bradner Heavy Type Gear Generator, m.d.
No. 12 Barber-Colman Double Overarm, m.d.
No. 12 Barber-Colman Single Overarm, m.d.
No. 34 Brown & Sharpe, m.d.
No. 44 Brown & Sharpe, m.d., Spur & Spiral
Pfauter Gear Hobber, Model RS 1, m.d., new
No. 3 Newark Gear Hobber, Plain Type, m.d.

GEAR TESTERS

No. 1 Brown & Sharpe Spur Gear Tester
12" cap. National Broach & Machine Co.
18" National Broach & Machine Co.
18" Gleason Bevel Gear Tester, m.d.
No. 471 Michigan Tool Co. Hob, Reamer & Gear Checker

AUTOMOTIVE GRINDERS

Kwik-Way Model H Piston Turning & Grinding Machine, m.d., late
No. 76 Van Norman Automatic Piston Turning & Grinding Machine, m.d., late

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. ⅜" valve stems, m.d.

DISC GRINDERS

Model 120A Gardner, double spindle, m.d.
No. 2 Gardner, belted m.d.
No. 151 Besly, m.d.
Hammond Disc Grinder, Model No. 600
Model V10 Hammond Belt Sander, m.d.
No. 4 Gardner Disc Grinder, m.d.
7½ H.P. U.S. Elec. Tool Co. Disc Grinder, m.d., new
14A Gardner Grinder, m.d.

IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK AUTOMATICS, BOLT THREADERS, HORIZONTAL & VERTICAL BORING MILLS, RADIAL DRILLS, HONING MACHINES, ENGINE LATHES, MFG. LATHES, MILLING MACHINES, PIPE MACHINES, PRESSES, PUNCHES & SHEARS, PLANERS, SAWS, RAILROAD MACHINERY, SHAPERS, SLOTTERS, SHEET METAL MACHINERY, TURRET LATHES, ETC.

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1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS
EMCO

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Ask Our Customers—THEY KNOW!

BALANCERS
GISHOLT 18, 1943

BORING BAR
CINCINNATI GILBERT 3½" Floor Type, with Outboard Bar Support, 1942.

BORING MACHINES
HEALD 46B Double end 4 heads, hyd. cross slide
HEALD 24B Double End Bore-Matic, 1942, 2 available; one with Hyd., Cross Slide.

DRILLS & TAPPERS
AVEY 6-Spindle No. 2MA6 Power Feed, No. 2 MT, 12" Overhang, 1943.
DEMCO 6 spindle No. 2 MT Hand Feed, 1944
BAUSH No. 47, 16 Adjustable Spindles, Hydraulic Table, Tapping, 1940.
BAKEWELL, No. 1, 1941
NATCO E5 Multiple driller and tapper, 14 adjustable spindles, 1941

GEAR EQUIPMENT
FELLOWS 6IA Gear Shaper, 1941. 2 available.
PRATT & WHITNEY 10" Hydraulic, 2 Wheel Gear Grinders (2), 1941.

GRINDERS, CENTERLESS
CINCINNATI No. 3 Filmatic, hyd. profiling 1943
CINCINNATI No. 3 Filmatic Type B Long. Bar Attachment, 1943

GRINDERS, CYLINDRICAL
SCHMALTZ 30"x48" Hydraulic, 1939.
NORTON 10"x18" Type C Hydraulic, 1942.
BROWN & SHARPE No. 5 3"x12" Plain with Plunge Grinding, 1941.

GRINDERS, INTERNAL
HEALD No. 70A3, 1940.
HEALD No. 72A3 Gagematic; 2 available, 1940.

LATHES, AUTOMATIC & PRODUCTION
GISHOLT No. 12 Automatic Hydraulic, Direct Spindle Drive, new 1946.
LODGE & SHIPLEY 3A Duomatic, 1946.
SENECA FALLS Model R-14 Lo-Swing, 1942.
SENECA FALLS Model LR Lo-Swing, complete, 1942.

LATHES, ENGINE
NILES 30"x144" centers, Timesaver T.A. Chuck, 1941.
LEBLOND 13"x18" Regal, T.A. Chucks Tooling, 1942.

LATHES, TURRET
GISHOLT No. 3 ram type universal bar and chuck, 1942.

MILLS
KNIGHT No. 40 Vertical, with Jig Boring Equipment; 1942.
CINCINNATI 34-36 Plain hydromatic variable feed attach., 1938.
CINCINNATI 56-90 Plain Hydromatic.
KEARNEY & TRECKER Model 1H—18" Manufacturing Mill, 1941.

PLANER
CLEVELAND 36"x36"x8' Openside, 2 Rail Heads. 1 Side Head, 1945.

Every Machine Unconditionally Guaranteed

MDNA

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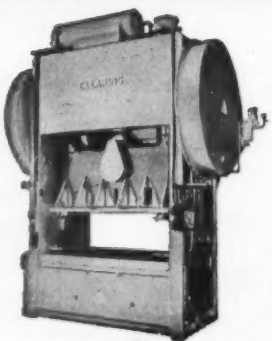
BLISS	OPEN BACK INCLINABLE
CLEARING	STRAIGHT SIDE (Single-Double Crank)
CLEVELAND	HORNING
FERRACUTE	KNUCKLE JOINT
HAMILTON	STILES TYPE
L & J	TOGGLE DRAWING
NIAGARA	CAM DRAWING also
TOLEDO	SQUARING SHEARS
V & O	PRESS BRAKES



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Rebuilt & Guaranteed

A FEW SELECTED ITEMS

DOUBLE CRANK
250 ton clearing — Bed 85x44—air clutch
250 ton clearing (gap) Electronic Air Clutch (1948) Bed 108"x38"

POWER SHEARS
1010 Cinc. 10'x10 GA.
1810 Cinc. 10'x¼", Gap 19"
4E Niagara 4'x¼", Gap 19"
6E Niagara 6'x¼", Gap 20"
S-362 Pexto 62"x10 GA.
S-2120 Pexto 10'x14 GA.
6½ H&J, 12'x⅜" Gap 36'

BRAND NEW
1048 Wysong 4'x10 Ga.
796 Wysong 8'x3/16"
1010 Wysong 10x10' Ga.
1025 Wysong 10'x¼"

JOSEPH **HYMAN** & SONS
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PHILADELPHIA 31, PA.
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3'11" DRESES Radial Drill—Motor on arm
10x20 MONARCH Model "EE" Toolmaker's Lathe
12x30" MONARCH Geared Head Lathes
30"x16' bed AMERICAN High Duty Geared Head Lathe
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
No. 5A BRYANT Internal Grinder
No. 172 HEALD Gap Internal Grinding Machine for large swing
10"x72" LANDIS Type C Hydraulic Plain Grinder --1942
24"x276" LANDIS Type "B" Roll Grinder, M.D.
12x12x36 MATTISON Hyd. Surface Grinder
Nos. 4D and 6S POTTER & JOHNSTON Automatic Lathes
1L GISHOLT Universal Turret Lathe, 1946
No. 8A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathes
No. 2 CINCINNATI HS Dial Type Plain Millers
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
No. 1-18 CINCINNATI Plain Mfg. Miller
No. 12 B&S Plain Bed Type Production Miller
6"x60" P&W Model C Thread Miller
Nos. 64 and 72 FELLOWS High Speed Gear Shapers
No. 12 FELLOWS Gear Shaver 1943
No. 36BM GOULD & EBERHARDT Gear Roughers
16/20" GOULD & EBERHARDT Industrial Shaper
36" OHIO "DREADNAUGHT" H.D. Shaper
100" BETTS Vertical Boring Mill, 2 heads

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ELECTRIC FURNACE TO 1850°
with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop Tool Room.
8" x 12" x 15" inside 4.5 K.W. $250.00
12" x 16" x 20" inside 9.0 K.W. $500.00
E. H. WILLIAMS
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Practically New
30" x 24" Bed Area
Special Offering—$3,500.00
WINSTON MACHINERY COMPANY, INC.
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COPYING LATHE
Tracer Controlled Universal Toolroom 20"x60". New 1952 in Perfect Condition—$9500.
F5-9913, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

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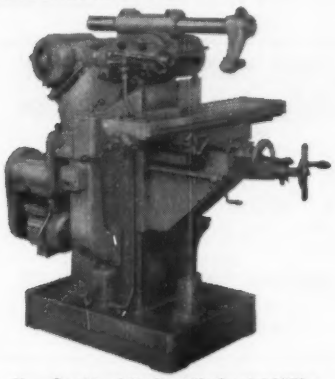
NEW AND USED MACHINE TOOLS

AUTOMATICS
Brown & Sharpe (1) Model #4
Brown & Sharpe (1) Model 2G, 1¼" capacity.
Brown & Sharpe (8) Model 0G, ⅝" capacity.
Brown & Sharpe (4) Model 00G, ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland Model AA-11, Serial #36586.
Cleveland Model B. Serial #42618/843.

BORING MILLS
Bullard 24" V.T.L. Spiral Drive
Bullard 8"—8 spindle, Multi-Matic
Cleveland 2½" Bar Capacity, Defiance 3¾" Bar
Giddings & Lewis #32, 3" #25, 2½" Bar.
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4" 4½" Bar, 60" Vert.

DRILLS AND RADIALS
American 6'x15" Universal, 4'13", 3'9"
Baker No. 321 Vertical Boring & Drill
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42 RPMSTERS
Cincinnati Bickford 6'15" col.
Natco #12, 20 spindle. Model B2A—10 Sp.
Leland-Gifford 2 LMS, 3MS
Leland Gifford No. 2—4 Sp.

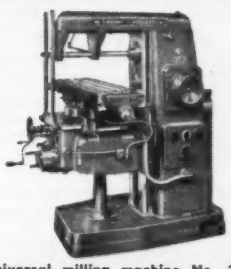


New Combined Vertical-Horizontal Milling Machine

ENGRAVERS
Gorton #ME, 1D, 3U, 3Z, Deckel G1L, G1, G2
Preiss UAM
Taylor-Hobson 3 dimensional Pantograph
New, 3 dimensional Deckel type

GEAR EQUIPMENT
Barber-Colman Mod. SHS, Sharpener
Barber-Colman #3, #2, #12 (3) also Type S.
Fellows High Speed Shapers 712, 725, 71, 7, 61A
Gleason Gear Rougher, Gleason #6 Power Tester
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Mikron No. 79 Gear Hobbers

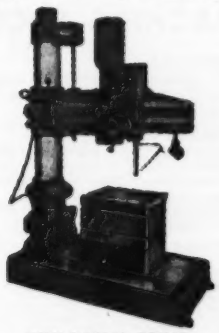
HYDRAULIC EQUIPMENT
Injection Molders, Pumps, Presses 125 to 800 Tons. Accumulators, Hobbing Presses, Etc.
Completely Engineered by a Competent Staff



New: Universal milling machine No. 2, rapid traverse, table 12" x 48" complete with coolant system and electrical equipment.

GRINDERS, SURFACE
New 9x24" Hyd. Feed 10x18", 6x18"
Abrasive 8x24", #33 Vert. & #34
Brown & Sharpe #5, #2 with Chuck
Gallmeyer & Livingston—65
Heald 22—12" chuck, Arter 12", Covel No. 15
Norton—6x18
Portman 12" Chuck Rotary—Reid #3, 11"x36"
Pratt & Whitney 12x36" Vertical
Taft Pierce #1 Precision
Thompson 6x18

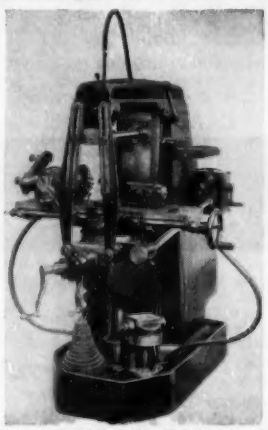
GRINDERS, MISCELLANEOUS
Brown & Sharpe #2 Universal 14"x28", #3 Univ.
Brown & Sharpe #5, 3"x18" Cylindrical
Brown & Sharpe #13 Universal Tool & Cutter
Cincinnati 6x18" Hyd. #4—Centerless—#2
Douglas Tool & Cutter 8"x15"
Gardner Disc Grinder 30"—15 H.P. Motor
Heald 72A3 Int. Centerless Sizematic
J. & L. Thread; TG615, Lempco 54" Swing
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton #2 Tool & Cutter, No. 1 Tool & Cutter
Norton Type C 6"x18" Semi-Automatic cyl.



NEW RADIAL DRILLS

LATHES
American 12"x30", Bridgeford 36"x20", 32"x16'
Gisholt Simplimatic 18"x16½", 2 Tables
Hendey 12"x42 and 12x30", 17"
LeBlond Regal 10"x3' bed, 13x42", 17" Late type
LeBlond 25/50x96" Gap, Late type.
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54", 20"x48"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
Sebastian 14"x6", So. Bend 13"x42", 14"x28"
South Bend 13"x5' Q.C.G., 10"x3½ Taper Att.
Sundstrand 8x15", 15' Stub

MILLS, PLAIN, UNIV. PROD.
Brown & Sharpe #0 Omniversal, #000 Production
Brown & Sharpe #2B Plain, No. 2, 3A, 21, #2L
Cinn. 08 Rise & Fall, 2-24 Automatic
Cinn. #3, 4 Plain, #18 Mfg. #5-48 Hydro.
Kent Owens IV, 1-8, 1-14, 1M, 2-20
Milwaukee 2H Universal, 2H Plain
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Heads, Mod. 1-18
(8) Van Norman #12—Hor/vert—Late



New Universal Mill with dividing heads and vertical attachments

MILLS, VERTICAL
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, 08 Vertical
Gorton 8D Super Speed
Milwaukee 4K & 2K
Morey #12M Profiler, 2 sp. #2 Maximiller
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG

PRESSES
Bliss 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Stokes Tablet Presses, Mod. R, RD3, RD3S, DDS.
Walsh No. 3 O.B.I. 23 Ton, L1 #3
Z & H #4½, O.B.I. 20 Ton

TURRET LATHES
Bardons & Oliver #2, 3, 7 Bar Feed
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindles
Jones & Lamson, Mod. 8A, No. 5
Warner & Swasey #1, 1A, 2, 2A, 3, 4, 5

This is but a partial listing. Write for free Catalog. Inquiries invited. ***HUNDREDS OF OTHERS***

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MILLING MACHINES

No. 5 Cincinnati High Power Plain, rect. overarm, a.c. m.d., feed control in knee, power quick traverse
No. 4 Cincinnati High Power Plain, rect. overarm, a.c. m.i.b., feed control in knee, power quick traverse
No. 4 Milwaukee D.O.A. Plain, a.c. m.i.b., p.r.t., Timken, #50 taper
No. 4 Cincinnati High Power Universal, a.c. m.d., div. hds.
No. 4-B Brown & Sharpe Heavy Plain, a.c. m.d., all geared
No. 3-B Brown & Sharpe Heavy Plain, a.c. m.d., all geared
No. 3 Cincinnati Dial Type Medium Speed Plain, a.c. m.i.b., p.r.t., Timken, #50 taper
No. 3 Cincinnati Dial Type Medium Speed Vertical, a.c. m.i.b., p.r.t., Timken, #50 taper
No. 2 Cincinnati Dial Type Medium Speed Universal, a.c. m.i.b., p.r.t., Timken, #50 taper
No. 2-MH Cincinnati Rect. overarm Plain, a.c. m.i.b., Timken, #50 taper, speed range to 1200 r.p.m., new 1940
No. 36 Van Norman Ram Type, a.c. m.d., Timken, #50 taper, div. hds., new 1943

LATHES

68"x21' ctrs Niles-Bement-Pond Heavy Duty Grd. Hd., actual swing 68", screw cutting, 4-speed a.c. m.d., taper attachment
48"x33' ctrs Niles-Bement-Pond Heavy Duty Grd. Hd., screw cutting, 30 h.p. d.c. drive, taper attachment
36"x120" ctrs American 12-speed Grd. Hd., a.c. m.d., taper attachment
36"x96" ctrs Schumacher & Boye Triple Geared, cone drive, taper attachment
22"x74" ctrs Lodge & Shipley 12-speed Selec. Grd. Hd., a.c. m.d., taper attachment
20"x72" ctrs Lodge & Shipley 12-speed Selec. Grd. Hd., a.c. m.d.
19"x54" ctrs LeBlond "Regal" Grd. Hd., a.c. m.d., Timken, new 1940
19"x48" ctrs LeBlond Heavy Duty Grd. Hd., 12-speed, a.c. m.d., taper attachment

TURRET LATHES

No. 4-A Warner & Swasey Saddle Type, a.c. m.d., 8" spindle, covered ways, p.r.t., bar feed
No. 3-A Warner & Swasey Saddle Type, a.c. m.d., 4¼ spindle, Timken, covered ways, taper attachment, screw chasing attachment, p.r.t. tooling
No. 3 Acme Full Universal, a.c. m.d., 4¾" spindle, hard ways
No. 2-L Gisholt High Production Saddle Type, 25 h.p. two-speed m.d., 4-1/16" spindle, Timken, hardened ways, p.r.t.

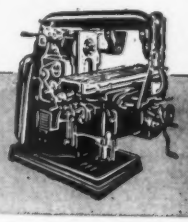
RADIAL DRILLS

3'-9" col. American High Speed, arr. m.d. thru gearbox, top speed 1500 rpm, fully enclosed head, very clean
3½'-9" col. Morris, a.c. m.d. gearbox
4'-11" col. American, a.c. Lima Drive
5'-13" col. American, a.c. m.d.
7'-17" col. Dreses, a.c. Turner Uni-Drive

MISCELLANEOUS

A-1-8 Arter Rotary Surface Grinder, a.c. m.d., 8½" chuck, new 1943
24" Bullard "New Era" Vertical Turret Lathe, a.c. m.d., side head, p.r.t., threading attachment
Model G Cleveland Punch & Shear, a.c. m.d., 60" throat, capt. 2" thru 1"

We have many other machines of all types in stock. Send us your inquiries. Phone: JUniper 3091



COX MACHINERY COMPANY, INC.

3 MINUTES FROM THE CINCINNATI HOTEL DISTRICT

P. O. BOX 1953 CINCINNATI 1; OHIO
Office&Warehouse 311-313 Bakewell St.,Covington,Ky.

LATE TYPE MACHINE TOOLS

650 Ton Verson Double Action Eccentric Press. 1940.
No. 41 Lucas Horizontal Boring Mill. 1941.
DB-215A Excello Double End Boramatic. 1945.
HP-100 LaPointe Horizontal Hydraulic Broach. 1945.
12" Gleason Gear Generator. 1942.
No. 7 Gleason "Revex" Gear Rougher. 1943.
16"x72" Norton Univ. 1942.
No. 35 Excello Precision Thread Grinder.
24-36 Bryant Hydraulic Internal Grinder. 1942.
No. 72A3 Heald Plain Hydraulic Internal Grinder. 1941.
No. 24 Mattison (Hanchett Type) Duplex Grinder.
No. 10 Sundstrand Automatic Lathe F & R Slides. 1942.
No. 6DRE Potter & Johnston Automatic. Late.
No. H5 Libby Universal Saddle Type Turret Lathe. 1939.
No. 3R Gisholt Universal Saddle Type Turret Lathe. 1942.
No. M-18 Kearney & Trecker Simplex Mill. 1943.

Indianapolis MACHINERY & SUPPLY CO.
1961 SOUTH MERIDIAN STREET
INDIANAPOLIS 6, INDIANA

LIFETIME AS A MEMBER OF THE MDNA

BALL OFFERS MACHINE TOOLS

★ **GRINDERS**
NORTON Cylindrical 23x72", M.D., 1942.
CINCINNATI Cylindrical, 12"x18", M.D., Older Type.

★ **MILLERS**
CINCINNATI No. 2MH, Universal, 1942.
CINCINNATI, No. 4, Vertical Mill, 1940.
INGERSOLL Planer Type Mill, 24"x24"x96", 3 Heads, Adj. Rail, M.D.
INGERSOLL Openside Planer Type Mill, 42"x 42"x16', M.D.

★ **LATHES**
AMERICAN Engine Lathe 30"x124" Centers, Geared Head, M.D.
AMERICAN Engine Lathe 30"x156" Centers, Geared Head, M.D.
SENECA FALLS, Lo-Swing, 8"x84" cc., Semi-Automatic.

★ **RADIAL DRILLS**
AMERICAN Radial Drill, 6'-17", Electric Clamping, M.D. Mtr. on Arm.
WESTERN Radial Drill, 7', M.D., 1942.

★*These Machines Can Be Inspected Under POWER!*

HIGH GRADE MACHINE TOOLS – IMPORTED & DOMESTIC
BALL MACHINERY COMPANY
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PHONE STATE 2-2520

76H BAIRD CHUCKER

3-Jaw Chucks—Threading Spindle Machine new in 1944.

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DETROIT 7, MICHIGAN

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HEAVY DUTY TOOL ROOM AND PRODUCTION MACHINES
18"-20" SWING, 60" CENTERS

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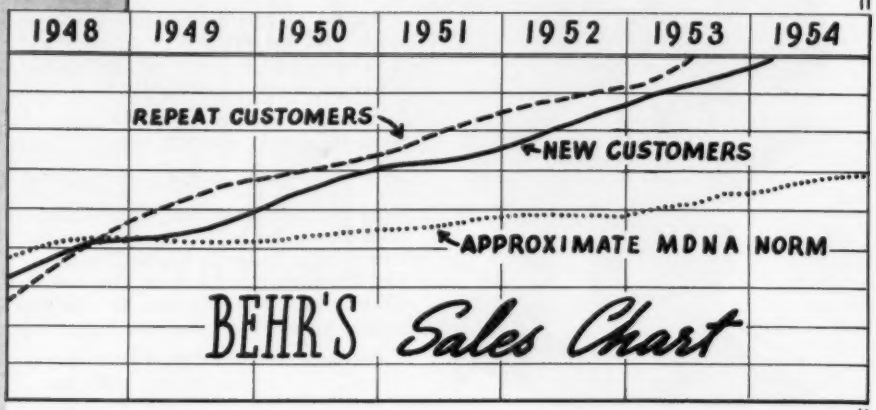
. . . and Still Climbing!



This chart made from records of Sales in Our Sales Office and Compared with Statistics from the MDNA

HERE IS A *PARTIAL* LIST OF MACHINERY IN OUR WAREHOUSE

- 17"x31" LeBLOND Regal Lathe 1941
- 16x102" REED PRENTICE Lathe 1941
- No. 1A WARNER & SWASEY Turret Lathe, 1943, BF & CH
- 2A W&S Pre. Turret Lathe Chucker, 1942
- 60"x16' PUTNAM Lathe
- No. 47A HEALD Boring Mill, Late, 2 Spdl. S.E.
- 4" UNIVERSAL Boring Mill, Horiz. Table 42 x 72, New 1944
- 8½D, 9J GORTON Mills, 1951
- No. 2 CINCINNATI Mill, Vert. HSDT, 1943
- No. 2 CINCINNATI GRINDER, Contour Cutter, 1946
- 16A BLANCHARD Grinder, 1944
- No. 226 GARDNER Grinder, Disc, 1948, Excel.
- 6x18 Cyl. LANDIS Grinder, Plunge Cut, 1943
- BARBER COLMAN HRS Hob Sharpener
- Mod. Z FELLOWS Shaper, 1943
- 1⅞" CONE Screw Machine, 8 Spdl., 1942
- 7½" GOSS & DE LEEUW 6 Spdl. Aut. Chucker; Work Rotating, 1943
- 24"x10' ROCKFORD Hyd. Openside Planer

SEND US YOUR INQUIRIES OR CALL 2-7721

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Follow the LEAD of SATISFIED USERS...

Select BEHR Machinery and have it rebuilt to like-new tolerances

Yes... follow the lead of these men who say "rebuild to specifications"—they represent those who buy machine tools from Joseph Behr & Son's large and complete stock. You can make your selection direct from our WAREHOUSE in Rockford and have it rebuilt right on the spot, if you desire—to new tolerances.

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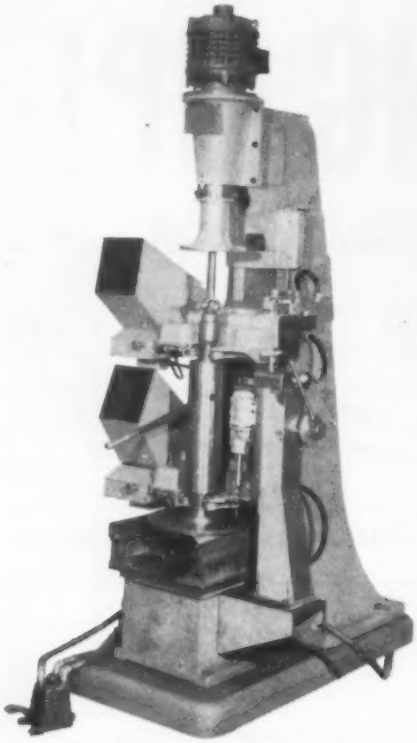

G.M. BALANCING MACHINE UD-72

DYNAMIC BALANCING

GENERAL MOTORS DYNAMIC BALANCING MACHINE

For Dynamic Balancing of Crankshafts
For Dynamic Balancing of Crankshaft and Flywheel Assemblies
For Dynamic Balancing of Similar Irregular Parts
Model UD-72, Serial 1156, New in 1949 and not used since 1951.
Capacity: up to 18" diam. x 36" long and 200# in weight.
Machine has only been used 2 years, Price $6,500.00

GENERAL MOTORS STATIC BALANCING MACHINE

For Static Balancing of Fans, etc., up to 10" diam. and 5# in weight.
Model STF-5, Serial 728, New in 1941. Price $1,500.00

2—#22 Heald Rotary Surface Grinders with 12" magnetic chucks, New in 1943, Serials 21395 and 19817.
Completely rebuilt by one of the best rebuilders in the country and guaranteed to be equal to new in performance. Price ..... $4,975.00 each

2—#1 Bakewell Precision Lead Screw Tapping Machines.
Serials 865 and 545, new 1942. Price ..... $750.00 each

SEMI-AUTOMATIC LATHE

Model 94SL Reid "Smallpiece" Production Lathe.
Serial US-165, New in 1943 and not used since 1945.
Front Slide for Straight or Contour Turning.
Rear Slide for Straight Feed in or Form Tool Work.
Capacity: Swing 9" over Carriage, 18" over Ways x 22" centers.
Machine has only had 2 years use. Price $2,750.00

We Endorse the MDNA Code of Ethics. Turn to Our Association Advertisement in This Issue.

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TRinity 2-6480

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OSWEGO, N. Y. **PHONE 1763**

LATHES

12"x36" Sebastian, Geared Head.
16"x6' Carroll-Jamieson, Geared Head.
25"x12' Sidney, motorized.

TURRET LATHE

No. 3L Gisholt, 1942.

MILLING MACHINES

Van Norman Hand, Motor Driven.
No. 2 Van Norman Plain, Motor Driven.
No. 2 Cincinnati Vertical, Motorized.

SURFACE GRINDERS

No. 2 B. & S., Motor Drive.
8" Arter Rotary.

AIR COMPRESSORS

Rix Vert., Two Stage, 7.3 C.F.M.
Worthington Two Stage, Hor., 270 C.F.M.

WELDERS

20 K.V.A. Federal, Motor Operated, 12" Throat.
30 K.V.A. National Flash Welder, 440 Volt.

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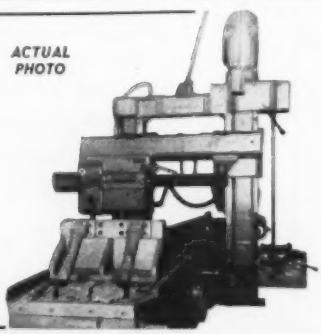

No. 2 B & S High Speed Autos. M.D.
No. 25 Heald Rotary Surface Grinder.
P & W 30" Vert. 2-spindle Profiler.
Peerless 6½ x 6½ Hack Saw, hyd.

D. E. DONY MACHINERY CO.
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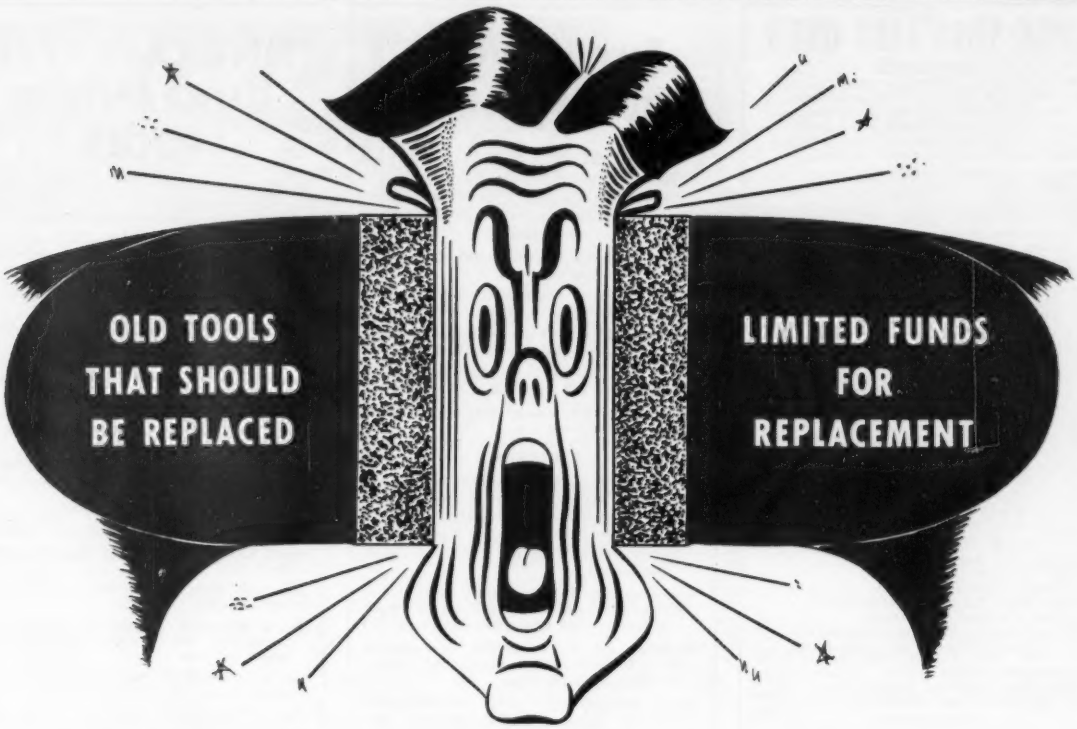
FS-8821, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.



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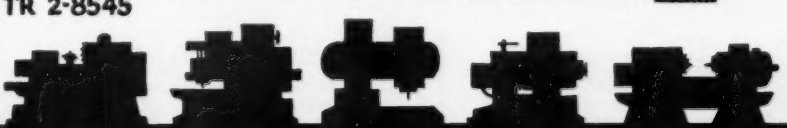

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BROACHES
5 ton No. 1 Foote Burt Duplex vertical surface
10 ton 48" stroke American horizontal hydraulic
10 ton 56" stroke Oilgear Model 3XA horizontal
12 ton 24" V-2 American vertical hydraulic
15 ton 36" Colonial single ram vertical surface
18 ton V-42 American hydraulic vertical

DRILL PRESSES
24" No. 321 Baker heavy duty
No. 310 Baker heavy duty
Natco double end horizontal, 2 way
12 spindle No. 12 Natco multiple
22 spindle No. 14 Natco multiple
34 spindle No. A16 Natco multiple
30" swing Allen power feed sensitive
No. 36HO Baker vert. hyd. drilling & boring
No. 15½ Foote Burt hydraulic vertical
No. B250H Natco hydraulic vertical
3½' arm 8" column American sensitive radial
4' arm 13" column Carlton M1B radial, late
6' arm, 3' extension, 16" column American radials, late type (two)

GEAR HOBBERS
No. 3 & No. 12 Barber Colman
Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
16" Cincinnati spur and spiral
8"-10" No. 1 Lees Bradner
No. 7S Lees Bradner
No. 3 Adams Farwell
72" S. & S. universal

GEAR MACHINERY MISC.
Red Ring gear shaver
8" Red Ring gear lapper
No. 60 Cross gear tooth rounder
Barnes "Mal" Hut O Lap gear lapper
National Cleveland gear checker
100"x24" Newark No. 7 spur gear cutter
10" Pratt & Whitney hydraulic gear grinder
Nos. 71A, 75A, 712 and 715 Fellows high speed gear shapers
Illinois gear measuring machine
No. 343 Sheffield gear chamferer

GRINDERS
No. 2 Cincinnati centerless, plain and Filmatic bearing
10"x18" Cincinnati Filmatic bearing
10"x18", 10"x36" & 16"x72" Norton cylindrical
16"x96" Landis cylindrical
16"x96" Landis cap type cylindrical
No. 120A Gardner opposed spindle disc, 20"
23" No. 84 Gardner opposed spindle disc
53" No. 24A Gardner horizontal disc
72" No. 179 Gardner horizontal disc
30" No. 8 Badger double disc motor on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagematic internal
No. 72A3 Heald Sizematic internal
No. 5 Bryant internal
6"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydraulic gear

LATHES
14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lipe HS Carbo-lathe, new 1943
17"x6' LeBlond Mfg. timken, (three)
19"x6' LeBlond Mfg. timken, new 1947 (three)
48"x52"x20'6" Niles Bement Pond engine lathe, like new

MILLING MACHINES
No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x121 Ingersoll adjustable rail planer type mill. mach., tracer controlled, new 1945
4—36 Cincinnati Hydromatic production
4—48 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

PRESSES
56 ton No. 304 Bliss, SS, solid frame, new 1942
60 ton No. 81 Cleveland, OBI, (two)
88 ton No. 50-D-36 Cleveland, DC, steel frame
95 ton No. 7 Hamilton, OBI, steel frame (three) new 1947
126 ton No. 306 Bliss, SS, tierod frame
180 No. 94½ E Toledo, DC, tierod frame
500 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

SHAPERS
16" American
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
26" Morton draw cut shaper
32" G & E shaper

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GEAR CUTTERS
Gleason 12" Straight Bevel Generator—Max. pitch diam. 16⅞"—Hydro-screw table drive —MD

GRINDERS
Brown and Sharpe No. 3 Universal—Cap. 14" x 40"—MD—Late type

Norton 12" x 36" Hydraulic Universal—Internal spindle—MD—Late type

Cincinnati 10" x 48" Plain Hydraulic—Filmatic bearings—power infeed—MD—1942 machine

Norton 16" x 36" Type C Plain Hydraulic—Takes wheel 30" x 3"—MD

Excello 35 Precision Thread—Cap. 12" x 36"—Wheel dresser—MD

MILLERS
Cincinnati No. 4 Horizontal — Rectangular overarm—Timken bearings—No. 50 taper—Power rapid traverse—MD—Vertical head

Cincinnati 72" x 54" x 16' Hypro Planer Mill—Infinitely variable speeds—2 rail and 2 side heads—MD

Milwaukee No. 3K Horizontal—Range 34" x 12" x 18"—Table 64" x 14"—No. 50 taper —Speeds to 1500 RPM—MD—Late type

Cincinnati No. 4 Vertical Dial Type—Range 42" x 16" x 16"—Table 16¼" x 78½"—No. 50 taper—MD—Late type

Hanson Whitney 7½" x 11½" Semi-automatic Universal Thread—Complete sets speed and feed gears—Max. length thread cut 42"—MD

SHAPERS
Pratt and Whitney 12" Vertical—Rotary table 24" dia.—Motor-in-base drive

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FINE LATE TYPE GUARANTEED TOOLS

16"x78" centers PRATT & WHITNEY Model "C" Toolroom Lathe, taper attachment, chucks, new 1943

28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943

36"x12' centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD

60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse

No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck

No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling

No. 2 VAN NORMAN Plain Horizontal Mill. New 1943

No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD

No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse

No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942

No. 4 CINCINNATI High Power Dial Type Vertical Mill, 25 HP motor, new 1951

48"x48"x10' NILES Double Housing Planer, box table, DC reversing motor drive.

48"x48"x12' Cincinnati Double Housing Planer, power rapid traverse, DC reversing motor drive, box table, forced feed lubrication.

48" widened to 69"x12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive

No. 2 BROWN & SHARPE Surface Grinder, motor inside base, power feeds

25A Heald Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD

1½" LANDIS Bolt Threader, leadscrews, AC-MD

30" MORTON Hydraulic Keyseater, new 1942

No. 6A MITTS & MERRILL Keyseater, capacity 0 to 4" width, 36" stroke, tooling

3'9" Column AMERICAN Radial Drill. AC Motor on arm. New 1943.

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12x68" PRATT & WHITNEY Thread Miller
30 Ton DIAMOND O.B.I. Power Press
BROWN & SHARPE Automatics (several)
W.F.F. Double Action Power Presses
±08 CINN. Vert. with Rotary Table
30" ESPEN-LUCAS Hydraulic Cold Saw
±2A WARNER & SWASEY Turret Lathe
±2 B&S Univ. Grinders, C&S, Tooling
HASKINS ±2 Cam Tapper, Index Fixture
±4 TORRINGTON 4 Die Swager
Numerous Other Machine Tools

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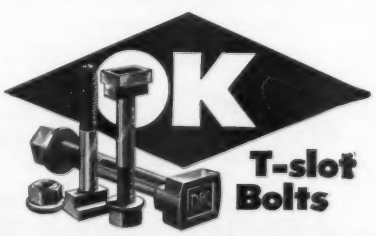

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The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Write for prices.

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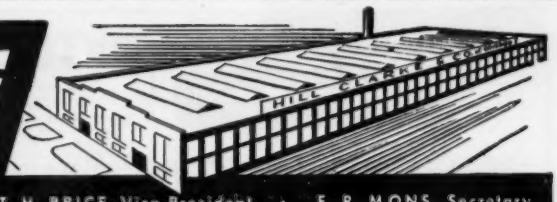


ESTABLISHED 1867 · W. L. DITFURTH, President · T. H. PRICE, Vice President · E. R. MONS, Secretary

Partial List

Automatics

1-1/16" Cleveland Model A (1942).

Boring Machines

No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

Drills

No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey
D-31 Fox Multiple.
No. 57H Fox 24 Spindle Multiple Drill (1943)

Gear Machines

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

Grinders

6"x18" Landis Type C (1942).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C cam Grinder.

Internal Grinders

No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16A-16 Bryant Internal Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 81 Heald Internal Centerless.

Hill-Clarke Norton Type Motor Driven Grinders

10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 96" Centers.
24"x264" Centers.

Hones

Model H-2 Micromatic Horiz. Hone.
Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone

Lathes

8"x15" Automatic Lathe.
R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.

Turret Lathes

No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warner & Swasey Turret.
No. 6 Warner & Swasey, cone head.
2¼"x24" Jones & Lamson.
18" Libby, M.D.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

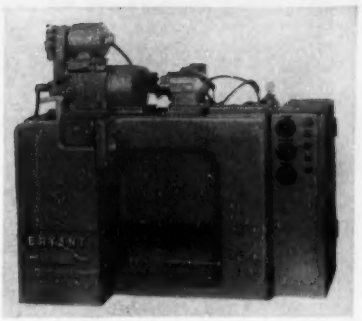
Planers

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

Milling Machines

54" Ingersoll Vertical Adjustable Rotary Mill.
No. 08 Cincinnati Vert. (1942).
No. 12 Cincinnati Pl. Auto.
4" Taylor & Fenn Duplex Spline.
6"x168" Pratt & Whitney Thrd. Mill.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.
No. 34-36 Cincinnati Hydro.

For more complete listing —see last issue or send for our latest "Green List" #163.



FOR HOLES 1/8"—3"

This late 1951 #1109 *Bryant Precision Internal Grinder*, in beautiful condition, swings 9", traverse stroke 6", self-contained electrical equipment with high frequency wheel spindle. Serial J-9600.

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THE FOLLOWING EQUIPMENT

Landis 4 x 18" plain cylindrical grinder with automatic cycle, hydraulic in feed and swiveling work table. Head arranged to take work either in collets or between centers. Machine supplied with 18 collets ranging from 5/64" to 1". Machine new in late 1952. (Serial Number: 476-61), and has had very little use.

Potter & Johnston #3-U automatic turret lathe complete with air chuck, tool holders, etc. Machine new in 1947 (Serial Number 30318) in excellent condition.

Excello #31 thread grinder complete, except lacking lead screws. Machine new in 1943 (Serial Number 2138) has never been used.

Gorton #16A Swiss type single spindle automatic screw machine with single spindle drilling attachment, 3 spindle drilling attachment bar feed, quality of tooling and cams new in 1943 (Serial Number 17345) has had very little use.

FS-1679, AMERICAN MACHINIST
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Serving the World's Largest Manufacturers

No. 47 Heald Single End Boramatic—Serial #4648	#36 Van Norman Miller, Late
DB2112-A Excello Single End Boramatic—Serial #10160	42" Bullard—Late
#5 Late Type Gisholt Turret Lathe—Serial #848-36	24" Bullard—Late
#5 B & S Cylindrical Grinder, Late	3L Broach-LaPointe—Late
	30"x25' cc Sidney Lathe

HAZARD BROWNELL MACHINE TOOLS INC.
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1⅝-4-CONE VERTICAL MULTIMATIC

1949—M.D. Lots of tooling, excellent, test under power, offered at less than 50% of replacement cost.

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FOR SALE

1—No. 4 Jones & Lamson Universal Turret Lathe. Serial No. 62717. Equipped with Barfeed, Collet Chuck, Good selection of collets. Excellent Condition. Guaranteed.

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Barclay 7-7119

You pay no more at MOREY ... you just get more

1000 LATE TYPE TOOLS IN STOCK

GEAR CUTTING EQUIPMENT:

BROWN & SHARPE #6-72" Auto. Cutter; M.D.
CROSS #1, 40, 45 Gear Tooth Rounder; M.D.
DETROIT type GG-35 Gear Grinder; late.
FELLOWS #6IA, 6Z2, 75, 7A, 77, 48, H.S. Gear Shapers; late.
FELLOWS 13LS Lapper, motor-drive; late.
GLEASON 3" and 12" Straight Bevel Gen.; late.
GLEASON 3" spiral bevel gear, gen.; M.D.
GLEASON 25" Straight bevel Generator; M.D.
GLEASON 24", 37" Bevel gear planers; M.D.
GLEASON #6 Revacycle, late type.
GLEASON #13 Hypoid cutter sharpener; late.
GLEASON #14 Spiral bevel Hypoid gear grinder; late.
GLEASON Model 17, Hypoid Spiral Grinder; M.D. late.
GOULD & EBERHARDT 12H Gear Hobber; late.
GOULD & EBERHARDT 18H Gear Hobber; M.D.
GOULD & EBERHARDT #30BM 3-spindle auto. gear rougher; M.D.
GOULD & EBERHARDT 120-M Double stanchion; M.D., late.
MICHIGAN Model 854 gear shaver, rack type; M.D.
MICHIGAN Gear Finisher, M.D., 862-24-A; late.
PRATT & WHITNEY 10" Gear Grinder; late.

LATHES, Engine & Mfg.:

AMERICAN 36"x12" Geared Head; M.D., late.
DENHAM 16"x48" centers, Gap; late type.
DENHAM 12"x54" centers, Gap; late type.
DENHAM 16"x72" centers, Gap; late type.
HENDEY 14"x30" centers, M.D., late type.
JONES & LAMSON "Fay" 20"x25" auto; M.D.
LANG 12"x42" grd hd Gap; motor-in base.
LeBLOND Mod. 7ACL Crankshaft; M.D.
LODGE & SHIPLEY 19"x30" centers, late type.
LODGE & SHIPLEY: No. 5-24" and 96" centers; DUOMATIC; Timken; late.
LoSWING 4x60", 4x84", 8x108"; late.
MONARCH 12"x30" centers; Model CKK; late. Timken; M.D. late.
MONARCH 14"x42" centers, "2" Magnamatic, Auto.
NILES 27"x96" centers, Time saver, Timken; late.
NILES 30"x46" Boring; "Time Saver"; late type.
SWIFT 16"x72" centers; late type.
U. S. model 810B Cutter Reliever, 8" cap; late.

PLANERS:

BETTS (Consolidated) 103"x84"x44"; 4 hds; PRT; box table; M.D.
DETRICK & HARVEY 48"x48"x16"; 4 hds; hydr.
GRAY 24"x24"x6'; motor drive.
GRAY 36"x36"x10' double housing "Maximum service," M.D.
LIBERTY 144"x76"x48' adj. variable openside, box table, 4 hds. PRT. M.D.
NILES 48"x48"x12' "Time Saver," 3 hds. late.
NILES 108"x84"x42' 4 hds. rapid traverse, box table. DC. M.D.
N.B.P. 72"x72"x30'; 4 hds. P.R.T. M.D.
NILES 48"x48"x10' double 4 hds; PRT; M.D.

PRESSES:

BESCO #18, 10-ton cap; OBI; NEW.
BESCO #EB2, 18½-ton cap., back flywheel; NEW.
BESCO #EB4, 40-ton cap.; back flywheel; NEW.
BESCO #21, 40-ton capacity; OBI; NEW
BIRDSBORO 325 ton, 31x31 bet. uprights; hydr.
BLISS #6 Straight side, 135-ton cap. 100 bet. uprights, M.D.
BLISS 525-ton cap. #410A dble action toggle drawing press.
BLISS #305 Straight Side Single crank; late.
BLISS #32-28" Straight side Double crank; late.
HANNIFIN 6-ton; 16-ton; hydraulic; late.
SHAW 250-ton hydr. flanging press; late.
WATERBURY FARREL #9 125-ton cap. blanking press, M.D.

RADIAL DRILLS:

AMERICAN 5' arm 13" column, Univ., M.D.
CINCINNATI BICKFORD 6'13" Universal, M.D.
KITCHEN & WADE 4' arm 13" col., Plain, M.D.

MISCELLANEOUS

ALEXANDER #2, 3-dimensional Engraving Machine; NEW 1952.
BAKER No. 5 Keyseater; motor drive.
BARNES No. 172, 214 Honing; M.D., hyd.; late.
FISCHER No. 1 Oil Groover; M.D.; late.
LANDIS 2" Double Spdle. Threaders.
LeBLOND No. 2 Deep Hole Reaming, late type
LeBLOND No. 2 Deep Hole Rifling, late type.
MANVILLE No. 3 Belt Head Trimmer, M.D.
MANVILLE No. 2C Screw Slotter, Motor Drive.
MANVILLE No. 1 Screw Slotter, Motor Drive.
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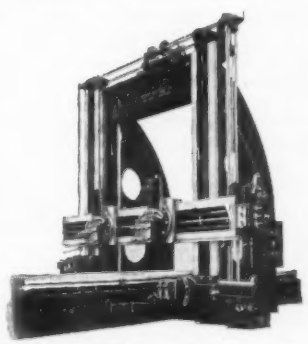

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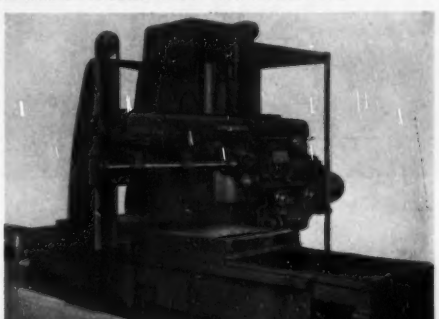

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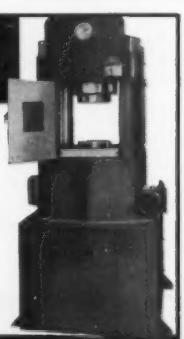

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Coining Press Slashes Sizing and Straightening Costs for Leading Automobile Builder

When a leading automobile manufacturer wanted to cut production costs on a forged steel lever Warco engineers worked with them in designing and building a 250-ton coining press with a chain type feed to automatically size and straighten the levers at a speed of 30 finished pieces per minute.

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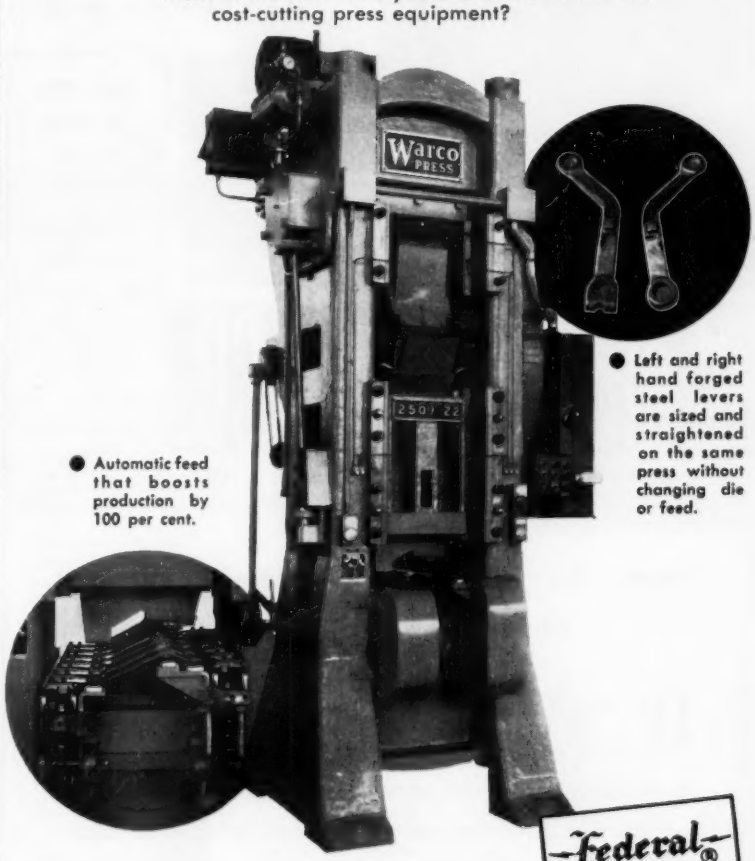

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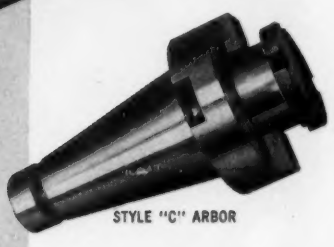

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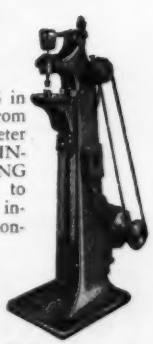

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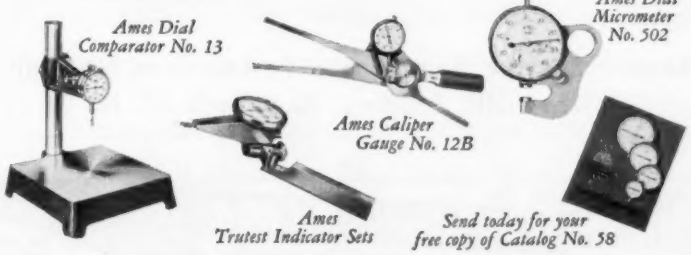

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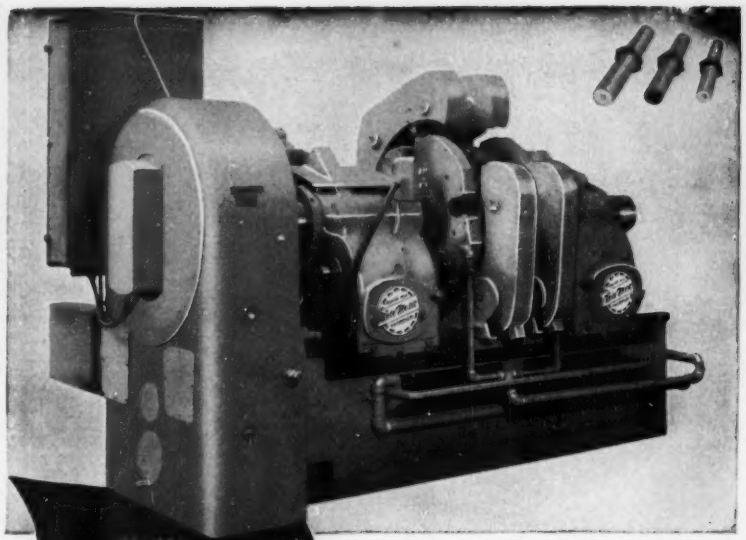

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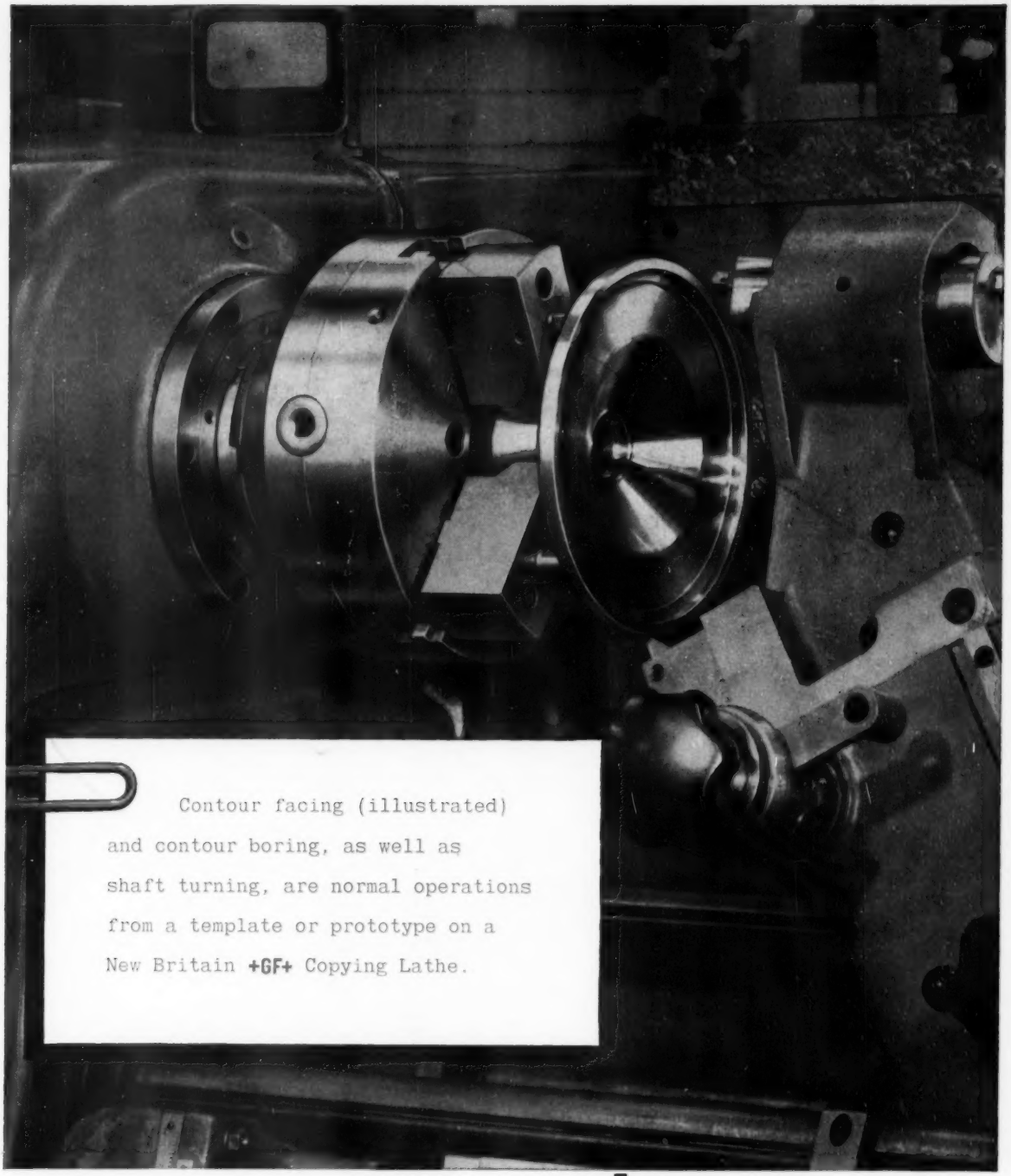

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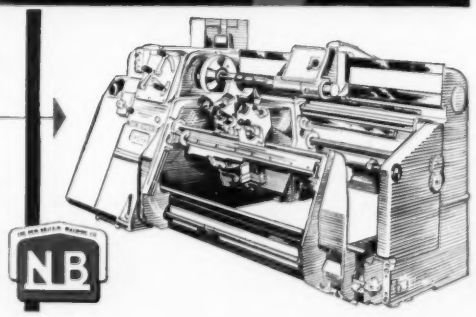

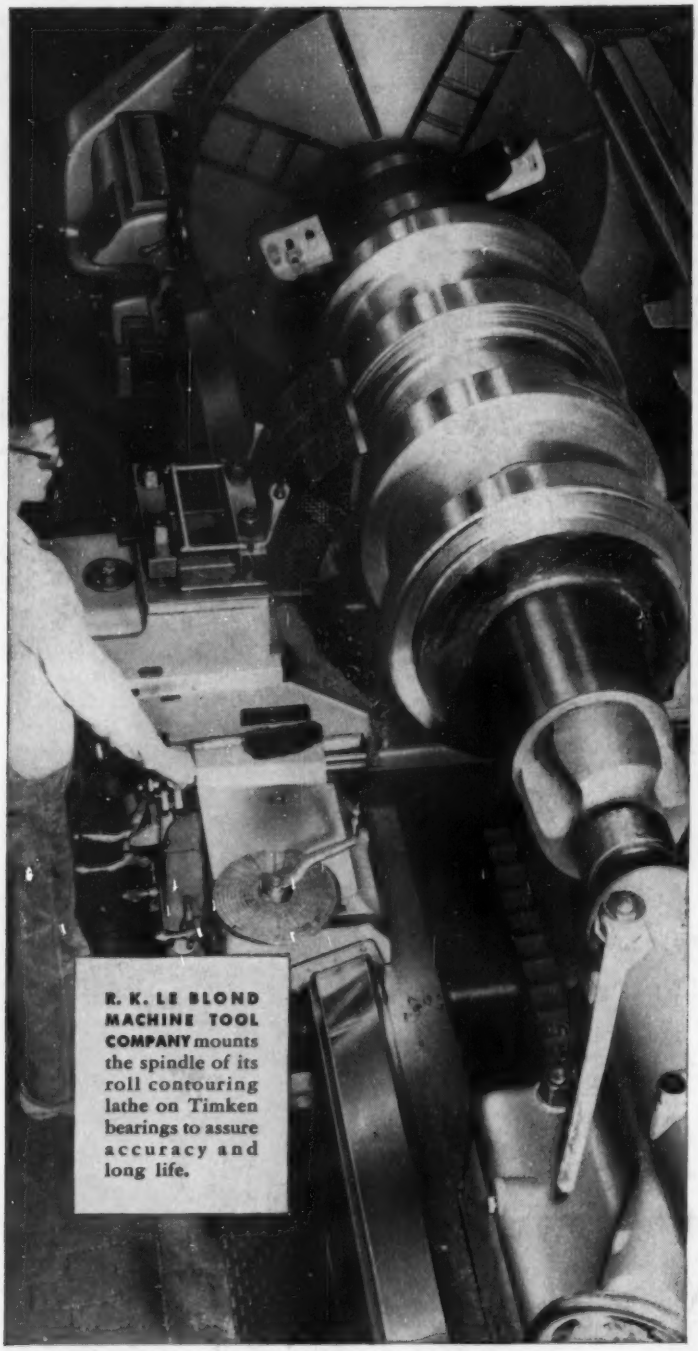

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...with help of TIMKEN® bearings

NOT too long ago it took a large eastern steel works 245 hours to machine a set of mill rolls used to shape structural steel. Now, the time's been slashed 61.7%. A LeBlond Roll Contouring Lathe, with spindle mounted on Timken® tapered roller bearings, does the job in 94 hours.

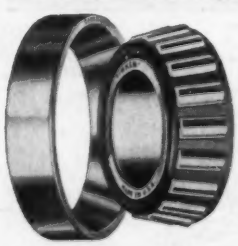
The spindle is held rigid and in accurate alignment because the tapered construction of Timken bearings enables them to take both radial and thrust loads in any combination. Their tapered design also permits pre-loading to any desired point to prevent chatter.

Timken bearings give the spindle extra load-carrying capacity because of line contact between their rollers and races. Friction is practically eliminated by the true rolling motion and incredibly smooth surface finish of Timken bearings. Long-lasting precision is assured.

Timken spindle bearings are precision bearings made specifically for spindle applications. Timken bearings are available with runout tolerances that can be held to a maximum of 75 millionths of an inch.

To get these advantages, always specify Timken bearings. And for help in designing your bearing applications, call on our engineering department. We may be able to help you devise a better way to do the job. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

MAGNIFYING GLASS INSPECTION OF EVERY ROLLER!

Every one of the over one billion Timken bearing rollers produced every year is inspected with powerful magnifying glasses to detect surface flaws. It's just one example of how the Timken Company insures uniform high quality.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←